UNITED STATES NAVAL MEDICAL BULLETIN

REPORT ON CONGRÈS INTERNATIONAL DE MÉDECINE ET DE PHARMACIE MILITAIRES

BY

WILLIAM SEAMAN BAINBRIDGE
COMMANDER, MEDICAL CORPS, UNITED STATES NAVAL RESERVE FORCES

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WILLIAM SEAMAN BAINBRIDGE
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NAVAL RESERVE FORCE

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NAVY DEPARTMENT,
Washington, March 20, 1907.

This UNITED STATES NAVAL MEDICAL BULLETIN is published by direction of the department for the timely information of the Medical and Hospital Corps of the Navy.

TRUMAN H. NEWBERRY,
Acting Secretary.

Owing to the exhaustion of certain numbers of the BULLETIN and the frequent demands from libraries, etc., for copies to complete their files, the return of any of the following issues will be greatly appreciated:

Volume VII, No. 2, April, 1913.
Volume VIII, No. 1, January, 1914.
Volume VIII, No. 3, July, 1914.
Volume VIII, No. 4, October, 1914.
Volume X, No. 1, January, 1916.
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PREFACE.

The United States Naval Medical Bulletin was first issued in April, 1907, as a means of supplying medical officers of the United States Navy with information regarding the advances which are continually being made in the medical sciences, and as a medium for the publication of accounts of special researches, observations, or experiences of individual medical officers.

It is the aim of the Bureau of Medicine and Surgery to furnish in each issue special articles relating to naval medicine, descriptions of suggested devices, clinical notes on interesting cases, editorial comment on current medical literature of special professional interest to the naval medical officer, reports from various sources, historical essays, notes and comments on topics of medical interest, and reviews or notices of the latest published medical books.

The bureau extends an invitation to all medical officers to prepare and forward, with a view to publication, contributions on subjects of interest to naval medical officers.

In order that each service contributor may receive due credit for his efforts in preparing matter for the Bulletin of distinct originality and special merit, the Surgeon General of the Navy will recommend that a letter of commendation be forwarded to him upon the acceptance of his manuscript for publication, and that a copy of this letter be attached to his official record.

The bureau does not necessarily undertake to indorse all views or opinions which may be expressed in the pages of this publication.

E. R. Stitt,
Surgeon General United States Navy.

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When contributions are typewriten, *double spacing* and wide margins are desirable. Fasteners which can not be removed without tearing the paper are an abomination. A large proportion of the articles submitted have an official form, such as letterheads, numbered paragraphs, and needless spacing between paragraphs, all of which require correction before going to press. The BULLETIN endeavors to follow a uniform style in headings and captions, and the editor can be spared much time and trouble and unnecessary errors can be obviated if authors will follow in the above particulars the practice of recent issues.

The greatest accuracy and fullness should be employed in all citations, as it has sometimes been necessary to decline articles otherwise desirable because it was impossible for the editor to understand or verify references, quotations, etc. The frequency of gross errors in orthography in many contributions is conclusive evidence that authors often fail to read over their manuscripts after they have been typewritten.

Contributions must be received two months prior to the date of the issue for which they are intended.

The editor is not responsible for the safe return of manuscripts and pictures. All materials supplied for illustrations, if not original, should be accompanied by a reference to the source and a statement as to whether or not reproduction has been authorized.

The BULLETIN intends to print *only original articles, translations, in whole or in part, reviews, and reports and notices of Government or departmental activities, official announcements, etc. All original contributions are accepted on the assumption that they have not appeared previously and are not to be reprinted elsewhere without an understanding to that effect.*

FOREWORD.

Belgium probably suffered as much from the devastating effects of war as did any other country in Europe. So great was the destruction of her cities and industrial establishments that it is little wonder the people of that country desire to prevent a repetition of the ravages of war, so far as is possible, by the establishment of a permanent peace among the nations of the globe which may to some extent be produced by fostering amicable relations between individuals of kindred professions or interests in the various nations.

With this end in view, and with a desire to place on record the lessons derived from the war, the military authorities of Belgium conceived the idea of convening a Congress of Military Surgeons and Pharmacists, international in its scope, which might sum up some of the practical experiences of the World War in medicine and surgery. Such a congress, it was believed, would be a real step toward the internationalization of military medical, surgical, and sanitary science. In response to the invitation of the King of Belgium, over 30 nations, either allied or associated in the late conflict, or neutral, were represented at this congress which was held in Brussels during the summer of 1921.

It was the aim of the congress to collect and standardize all available facts developed by the war for use not only in future warfare but for any catastrophe which might arise during times of peace. Obviously it would be impossible to cover completely at the meetings of a single congress all the phases of the World War; hence the organizers of the congress selected the following six topics for discussion:

1. The general organization of the medical service of the army and navy with its relations with the Red Cross.
2. Lessons of the war in the modern treatment of fractures of the limbs.
3. The campaign against tuberculosis in the army and navy.
4. The campaign against venereal disease in the army and navy.
5. Gas warfare.
6. The purification of water in the field.

The report which follows contains an outline of the proceedings of the delegates to the congress, a digest of the papers presented by

them and their conclusions which are said to represent the opinion to date of the nations which participated in the congress.

So successful were the series of conferences held by the delegates to this congress that in February, 1922, arrangements were made for another congress to meet in Rome in May, 1923, at which four general subjects will be discussed, viz:

1. The general principles of evacuation of the wounded.
2. The collaboration of military and civilian authorities in social hygiene, physical education, and the prevention of disease.
3. Methods of disinfection and disinfestation in times of war and peace.
4. The treatment of wounds of the chest.

It seems not unlikely that these congresses will be perpetuated by the formation of an international association of military surgeons which would bring closer cooperation, better mutual understanding among the members of the medical profession of the various nations, and be an influence in the prevention of war.

E. R. S.

HIS MAJESTY, ALBERT, KING OF THE BELGIANS.

U. S. NAVAL MEDICAL BULLETIN

VOL. XVII. DECEMBER, 1922. No. 6

SPECIAL ARTICLE.

REPORT ON "CONGRÈS INTERNATIONAL DE MÉDECINE ET DE PHARMACIE MILITAIRES," HELD IN BRUSSELS, BELGIUM, JULY 1921, AND MEETING OF THE "COMITÉ PERMANENT," HELD IN BRUSSELS, BELGIUM, FEBRUARY, 1922.

By WILLIAM SEAMAN BAINBRIDGE, Commander, Medical Corps, United States Naval Reserve Force, Delegate from the United States of America.

INTRODUCTION.

All who have played even a small part in any war and others who have come only in touch with some of its dire results know that it can be the greatest of all atrocities. The World War surpassed the preceding ones in every phase. But balanced against man's keenest ingenuity in discovering methods of warfare more horrible than any that have gone before and in inventing new implements to kill and maim, are the untiring efforts of the members of the medical, surgical, and sanitary departments of the armies and navies of the world in the salvaging of remnants of life and limb. One has but to read the medico-military histories of preceding wars to realize the marked effect they have had in the advance of medicine, surgery, and sanitation. These advances have proved of benefit not only during the progress of hostilities but in time of peace, when there is a continuous industrial battle between man and man-made machinery or the elements themselves.

More than 500,000 peace-time casualties occurred in continental America during 1916. Industrial accidents are constantly on the increase in all parts of the civilized world, owing to the progressive extension of human activities and the introduction of new and somewhat dangerous machinery into factories, engineering excavation, and construction work, etc. The reduction of this annual toll, in lives and limbs, is a problem to be solved like that of the reclamation of the wounded and disabled on the battle field.

The period of reconstruction following the greatest war in history is fraught with the most interesting and far-reaching problems for the countries of the Allied and Central Powers. A plan, conceived by Belgium in the summer of 1920, to obtain whatever benefits there might be hidden in the chaos which resulted at the end of the war, culminated one year later in the historical meeting of representatives of many nations; to discuss the medical, surgical, and sanitary lessons learned from over four years of conflict.

Belgium's practical keenness of vision resulted in the successful conclusion of arrangements for this meeting in Brussels of the official delegates of all the medical services of the armies and navies of the allied, associated, and neutral powers. The conception and maturation of this plan was in itself a difficult task, and still greater difficulties had to be overcome in the securing and coordinating of contributions brought from all sides.

The first "Congrès International de Médecine et de Pharmacie Militaires" was called in the summer of 1921, and not sooner, because the object was to secure the full lessons of the war, not only during the conflict, but immediately afterwards, in the reconstruction period. No better time could have been chosen than precisely this psychological moment when the allied and associated nations were still held close together by links forged in the war against a common foe. It was the opinion of a number that it would not have been wise to expose a congress of this description and purpose to the chances of time and its many possibilities. The associated and neutral powers were invited to join, as some of their representative medical men had worked with the Central Powers in an individual capacity or as military medical observers. The congress thus received the benefit of war-taught lessons on *all* sides, hostile as well as allied. It would be impossible to write a true and complete history of the war and the lessons learned, from a medical or other standpoint, without a full knowledge of the experience of all sides. A composite viewpoint is absolutely essential to a correct presentation of the medical and surgical lessons of the war.

The congress was held in the spacious halls of the Palais Mondial, in the Parc du Cinquanténaire, in July, 1921. The most stringent actual problems, which were on the program were investigated and discussed by those considered most competent to do so. Space in the hall was set aside for exhibits of special interest relating to the questions to be considered. The congress aimed at collecting and standardizing all available facts for use not only in future wars but for any exigencies that might arise during peace.

Belgium foresaw—and events proved her right—that if the representatives of the different nations could be brought together and in-

duced to lay on a council table the individual experiences of the war, of each separate country, a general discussion would naturally result, and culminate in a number of helpful conclusions in regard to many points. This composite information then could be standardized and codified.

Twenty countries sent official representatives from the medical department of the army or navy, or both. Over 30 nations were personally represented by from 1 to 20 distinguished members. In addition to the delegates who were sent to the congress, other prominent men were invited to contribute their experiences or offer suggestions. No distinction was made between contributors, as the object was the securing of real facts. A considerable number of governments had been heard from by letter, expressing their interest, willing cooperation and intent to join future congresses in the person of their delegates. At the completion of the meetings, the conference was unanimously voted of such value that a permanent committee, composed of eight nations, including the United States, was appointed. This newly formed permanent committee will be referred to again in greater detail.

LIST OF OFFICIAL DELEGATES WHO PARTICIPATED AT THE FIRST CONGRÈS INTERNATIONAL DE MÉDECINE ET DE PHARMACIE MILITAIRES.

ARGENTINE REPUBLIC.

Lieut. Dr. Nicholas Guadino.

BELGIUM.

Dr. Jules Voncken, Military Hospital of Liege.
Dr. Van der Smissen, ministry of war.
Gen. Dr. Wilmaers, Brussels.
Doctor Gianolla, surgeon of the Military Hospital of Charleroi.

BRAZIL.

Dr. Joao Alfonzo de Souza Ferreira, Médecin Major, Rue Maia Lacerda, 51, Rio de Janeiro.
Dr. Joao Florentino Meira, Rio Gr. do Sal, Cruz, Alba.
Dr. Alarico Damazio, 156, Rue Miguel de Frios, Nictheroy, Rio de Janeiro.
Lieut. Pharmacien Manoel Vieira da Fonseca, Junior, 64, Rua Para, Estacio de Sa, Rio de Janeiro.

BRITAIN.

Col. E. M. Pilcher,[1] C. B. E., D. S. O., Royal Army Medical Corps, London.
Maj. A. D. Stirling, D. S. C., Royal Army Medical Corps, London.
Surg. Rear Admiral J. Chambers, C. M. G., M. B., R. N., Admiralty, London.
Surg. Commander E. T. Meagher, R. N., 84 St. Georges Road, Great Yarmouth.

CHILE.

Dr. Marcos Donzo, Rue Villaret de Joyause, 5, Paris (XVII^e).
Dr. Cifuentes, Chilean Legation, Av. du Bois de Boulogne, Paris.

[1] Recently promoted to major general.

CHINA.

S. H. Chuan, major general, director of the Military Medical School, Peking.

DENMARK.

Dr. M. C. T. Hansen, medical inspector, chief E. M. of the medical service of the Danish Army, 42, Brigade, Copenhagen.

FRANCE.

Médecin Inspecteur Général Sieur, Boulevard St. Jacques, 54 (XIV^{e}), Paris.
Médecin Principal de 1ère classe Sacquépée, Val de Grâce, Paris.
Médecin Principal de 2ème classe Picqué, Cours Merlin, 39, Talence (Gironde).
Médecin Principal de 2ème classe Uzac, Rue de Bercy, 139, Paris.
Monsieur le Docteur Lapin, Direction Générale du Service de Santé de l'Armée Française au Maroc, Rabat (Maroc).

GUATEMALA.

Dr. Manuel Arrayo, Guatemala City.

HOLLAND.

Lieut. Col. A. C. Ten Hove, Stolberglann, 100, La Haye.
Capitaine J. F. Huk, Binninhaven, 104, Helder.
Capitaine De Vrize, Weteringschans, 53, Amsterdam.

INTERNATIONAL RED CROSS COMMITTEE.

Doctor D'Espine, Promenade du Pin, I, Geneva.
Dr. A. Reverdin, Promenade du Pin, I, Geneva.

ITALY.

Lieut. Col. Filippo Caccia, chief surgeon, Military Hospital, Rome.
Lieut. Col. (complementary) Mariano Carruccio, Rome.
Lieut. Col. Dante Ferraro, St. Anne Marine Hospital, Venice.

JAPAN.

Chief Surgeon Kensa Oyama, Tokio.

LEAGUE OF RED CROSS SOCIETIES.

Colonel Ritchie, adjunct chief of section on venereal diseases, Coeur de St. Pierre, 9, Geneva.

MEXICO.

Dr. Luis Rivero Borrel, Mexican Legation, Paris (in 1921) in 1922, 4a Sta. Maria de la Bibero, 138, Mexico City.

NORWAY.

Dr. Reichborn Kjennerud, divisional surgeon, Frederikshald.

POLAND.

Doctor Dzierzkowski, chief of the Medical Service of the Polish Mission in France, Rue Bugeaud, 6, Paris.

SPAIN.

Commandant Agustin Van Baumberghen, Barquillo, 15, Madrid.
Commandant Mariano Gomez Ulla, Leganitos, 10, Madrid.
Capitaine Pharmacien, Antonio Gordon Moyano.
Maj. Pharmacien Leopold Lopez Perez, San Fernando (Cadiz).
Docteur Fernandez Cuesta y Porta, Subinspector Sanidad, Anuado Asenak, 20, ento Madrid.

SWEDEN.

Dr. S. R. Erhardt, chief surgeon of the Swedish Army, Stockholm.

SWITZERLAND.

Colonel Hauser, chief surgeon of the medical service of the Swiss Army, Bern.
Lieutenant Colonel Thomann, chief pharmacist of the Swiss Army, Bern.
Colonel Nienhaus, divisional surgeon, Davos-Platz.

CZECHOSLOVAKIA.

Col. Dr. Louis Fisher, ministry of national defense, Prague.
Gen. Dr. Ch. Franz, V Brchova, 4, Prague.
Commandant Dr. Jean Levit, II Vaclavske, 49, a Prague.
Dr. Clement Zrunek, ministry of national defense, Prague V.

UNITED STATES OF AMERICA.

Commander William Seaman Bainbridge, Medical Corps, United States Naval Reserve Force, 34 Gramercy Park, New York, N. Y.

Permission to attend the congress was not granted to the Russian Soviet delegation, consisting of six members, who had arrived for this purpose at the frontier of Belgium. An invitation from His Majesty's Goverment through official channels was necessary for membership in the congress.

The following was the preliminary printed program which was changed and enlarged according to the necessities which arose at the various meetings:

PROGRAM.

"FIRST CONGRÈS INTERNATIONAL DE MÉDECINE ET DE PHARMACIE MILITAIRES,"
PALAIS MONDIAL, BRUSSELS, BELGIUM, 15–20TH JULY, 1921.

[Under the patronage of His Majesty, the King of Belgium.]

First day (*July 15*).

Inaugural meeting.
Reception by His Majesty, the King.
Address by the inspector general of the army medical service, president of the Congress.
Assignments of chiefs of delegations.
Proclamation of the opening of the 1921 congress.
Informal reception of the members of the congress by the executive committee.

Second day (July 16).

Forenoon meeting (3 hours): Topic, clinical and therapeutic study of the war gases employed during the war by the Central Powers; the sequelæ of their effect on the organism and their influences on invalidity claims.

Afternoon meeting (3½ hours): Topic, general organization of the medical service in the armies and relations of the military medical service with the Red Cross.

Assembly of the visiting ladies for automobile trips to the surroundings of Brussels.

Visit to the military hospital in Brussels.

Third day (July 17).

Excursion to Spa. Departure by special train at 7.25 a. m. Reception at the station by the communal authorities. Visit to the bathhouse. Discussion of thermal springs, by Doctor Schaltin, battalion surgeon of the reserve corps. Luncheon, offered by the College des Bourgmestre et Echevins of Spa and the administration of the springs. Excursion and visit to the Borgoumont Sanatorium. Visit to the Abri de l'Empeueur. Tea, served in the Casino. Return to Brussels by special train.

Fourth day (July 18).

Forenoon session (3½ hours): Topic, the antituberculosis campaign in the army.

Visit to the military school in Brussels.

Afternoon session (3 hours): Topic, the antivenereal campaign in the army.

Automobile trip to the outskirts of Brussels.

Visit to the military hospital and the school for the reeducation of war cripples in Woluwe.

Fifth day (July 19).

Morning session (3 hours): Topic, lessons of the war in the treatment of fractures of the limbs.

Afternoon: Departure to Antwerp. Reception at the city hall. Visit to the harbor and docks. Visit to the central pharmacy of the army and to the military hospital. Return to Brussels.

Sixth day (July 20).

Forenoon session (3 hours): Topic, purification of water in the field.

Afternoon (3 hours): General closing session.

Banquet in the Hotel Métropole.

America presented to the congress an exhibition of 4,800 feet of reel showing "Some of the activities of the Medical Corps of the United States Navy." These reels had been prepared under the direction of Rear Admiral E. R. Stitt, Surgeon General, United States Navy, and attracted much attention and favorable comment. After the original showing at the congress, the exhibition of the reels was repeated on special invitation of the Royal Society of Medicine, in the halls of the Royal Academy of Medicine of Brussels.

The unanimous conclusions of the congress will be given at the end of this report, and constitute the outcome of prolonged. earnest,

HER MAJESTY, ELIZABETH, QUEEN OF THE BELGIANS, IN THE COSTUME OF THE BELGIAN RED CROSS.

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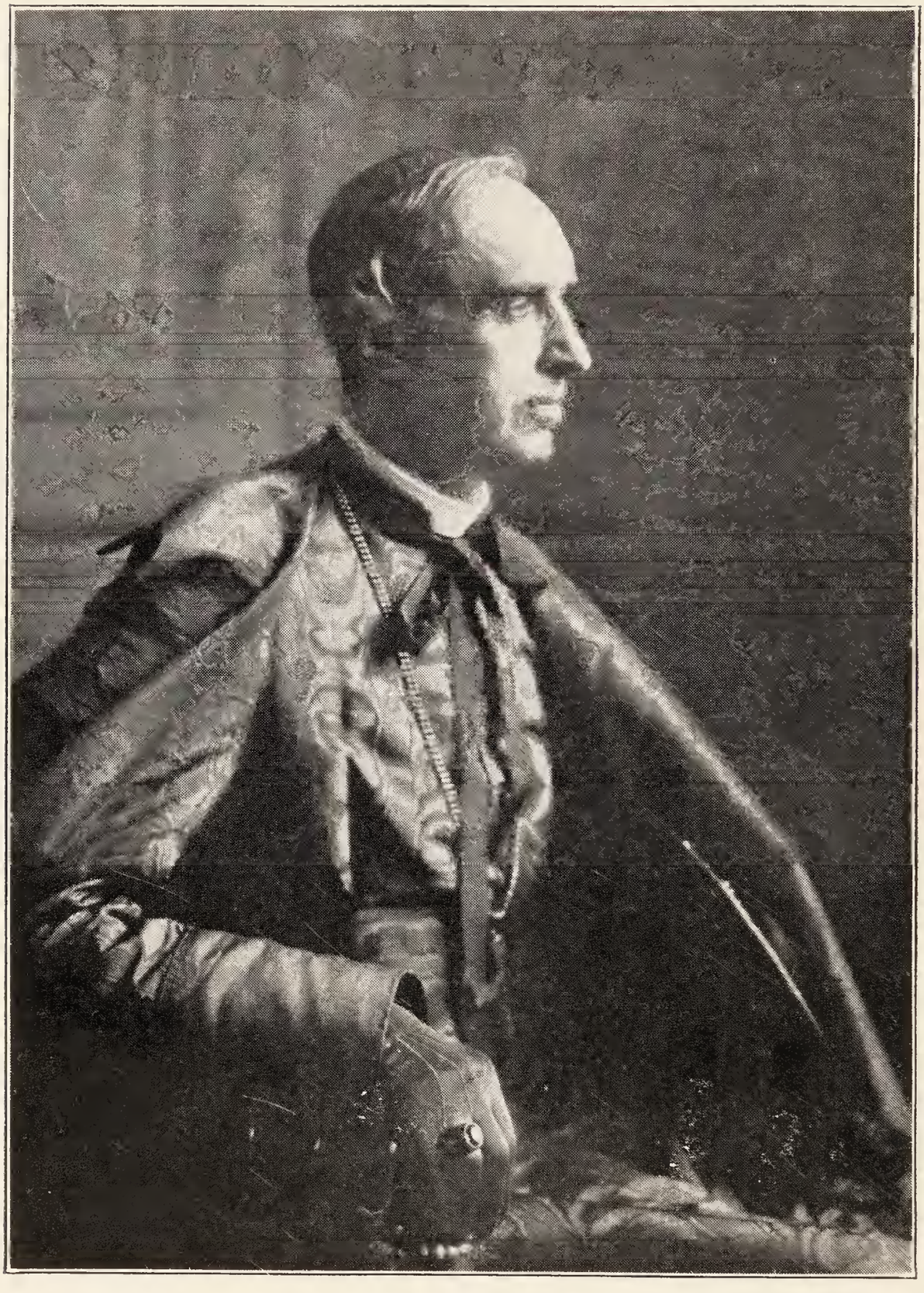

CARDINAL MERCIER, ARCHBISHOP OF MALINES, WHO RECEIVED SOME OF THE DELEGATES.

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and careful deliberation. The following procedure was decided upon: In the course of the official proceedings, the contributing nations, according to their own selections of a particular field of inquiry, within the scope of the subjects selected for discussion at this first congress, presented their papers, to which other nations added their own supplementary data. A general discussion followed, upon the basis of the entire available material. A committee was then formed of all those who had furnished information and assisted in the resulting discussion, and the subject was reconsidered in all its bearings. After a subject came back the committee was enlarged by any additional members who joined the discussion. Finally, the committee withdrew and definitely drew up the conclusions indicative of the status of the inquiry under consideration. These conclusions were then brought back for comment and criticism into the conference, where they were analyzed and if necessary reframed until the final form agreed upon was the unanimous statement of the entire body.

The congress met most auspiciously under the patronage of King Albert I of the Belgians, a ruler claimed not only by his own people but, as expressed by one speaker, a purposeful personality who has become a part of the life, the affection, the history, of all countries represented at this first meeting. Attended by his ministers and a large number of deputies the King was present at the introductory address delivered by Doctor Wibin. inspector general of the medical service of the Belgian Army. Prior to the afternoon session, the King met the delegates personally, shaking hands and holding a few minutes conversation with each.

Wibin (Belgium).

Doctor Wibin in his introductory address respectfully acknowledged the honor accorded to the congress by the patronage of King Albert and Queen Elizabeth of the Belgians, and voiced his gratitude to First Minister Carton de Wiart and to the minister of national defense for their participation in the presidency of the honor committee. The organization of the congress was authorized by Ministers Janson and Deveze, and the latter liberally provided the necessary funds. The speaker also thanked all the members of the honor committee, Government officials, university professors, and others for lending their moral support. Stress was laid by him on the fact that while no war has been more murderous than the one which is called the World War, there is also none which has proved more fertile in high moral lessons and great scientific achievements. At the beginning of the war mistaken measures resulted in surgical disasters, but the

truth was soon revealed, and under the expert guidance of Dr. A. Depage surgical intervention became promptly organized at the front.

Surgical automobile ambulances were created which permitted the rapid evacuation of the wounded from the various sectors. The scattered and imperfectly utilized surgical services were reorganized and centralized. The performance of surgical operations in the proximity of the front without any avoidable delay became the order of the day. At the same time the scientific foundations of modern surgery were established through the biological and bacteriological studies of war wounds, the former determining the biological evolution of these wounds and the latter investigating the development of their infectious microbic invaders. The devitalization of the traumatized tissues came to be understood as the primary condition for the development of infectious germs. The dead or dying tissues were found to undergo leukocyte proteolysis on the one hand and bacterial proteolysis on the other; these two processes passing in an inverse direction, both in time and space, leukocyte proteolysis from the periphery to the center and bacterial proteolysis from the center to the periphery. This phenomenon has a considerable bearing on the accurate determination of combative measures, and especially the exact moment of their application. Surgeons learned that the first phase of spontaneous cleansing of war wounds is actually the critical and dangerous period, and that this phase must accordingly be safeguarded or at least made as short as possible by modifying, through surgical measures, the physical and biological conditions of the wound. The infectious complications of war wounds can be successfully avoided by adequate treatment. The World War, through a number of remarkable discoveries which were made during its course, confirmed the older teachings of latent microbism and placed them on an accurate scientific basis. The distressing experiences of the early months of the war no less than the new biological and bacteriological revelations culminated in a veritable surgical revolution. Radical operative interventions were introduced with excellent effects on the condition of the wounded. "Débridement" is a term which has come to stay, and since the World War belongs to the vocabulary of all surgeons who served on the side of the Allies. Va-

rious auxiliary measures were promptly added to the new great surgical principles of wound treatment. Extensive débridement, extraction of foreign bodies, assisted by antiseptic irrigation or leukocyte stimulation, led to a marked improvement in the prospects of the wounded. Finally radical surgical asepsis of the war wound through direct excision of the hopelessly damaged tissues was recognized as the correct procedure for the arrest of the incipient anerobic process and thereby for the prevention of the development of aerobic infection.

But the war surgeon, still unsatisfied, aimed at the rapid healing of the wound by first intention, and the fruit of his labors was immediate primary wound-suture, which was followed by brilliant results in suitable cases. The great revolution of surgical treatment had an excellent influence on the various types of wounds, such as wounds complicated by bone fractures, wounds of joints, of the chest, of the skull, and penetrating abdominal wounds. Scientific orthopedic measures assisted the ultimate outcome of wound treatment, and it was realized, as a war-taught lesson, that the surgeon and the prosthetist must closely cooperate in the best interest of the patient.

The long and painful years of the World War have furthered the advance not only of operative surgery but also the development of internal medicine, both general and special; of military hygiene, and of the pharmaceutic services of the allied armies. The practical application of its sound chemical knowledge by military pharmacy rendered most valuable service to the allied armies. The pharmaceutic service not only insured the medico-surgical equipment of the armies by the activity of its great centers, but it helped essentially to safeguard the health of the troops by its numerous research laboratories, its work in water purification, and its important contributions to the campaign against poisonous gases and the neutralization of their effects. The military pharmaceutical services were gladly welcomed by Doctor Wibin as participators in the work of this congress.

He emphasized, in conclusion, that this congress is to consist of an exchange of the golden nuggets of experience acquired in the course of the war, and expresses the hope that this first meeting would be the prelude to a series of many others, which will permit military medi-

cine to keep brightly burning the flame of vigilance and activity, for the greater benefit of the armies and of suffering humanity.

At the end of his introductory address, Lieutenant General Wibin declared the "First Congrès International de Médecine et de Pharmacie Militaires" as opened.

General Inspector Sieur, chief of the French delegation, thanked the Belgian Government for the welcome accorded the participants in the congress, and addressed a special salutation to the King and Queen of Belgium. His Majesty withdrew, accompanied by the members of his suite and the organizing committee.

The members of the congress scattered in the drawing rooms of the Palais Mondial, where a unique spectacle was presented by the mixture of nationalities and uniforms.

It is interesting to note that an official photographer was attached to the congress and some of the illustrations contained in this report are copies of the Government pictures. Moving picture reels were taken of the various activities of the delegates and are in the possession of the Belgian officials for permanent record.

The following topics had been selected by Belgium for discussion and sent with each invitation to the countries asked to participate in the congress.

(1) General organization of the medical service and its relations with the Red Cross.

(2) Lessons of the war in the modern treatment of fractures of the limb.

(3) The campaign against tuberculosis in the army.

(4) The campaign against venereal diseases in the army.

(5) Poison gas in warfare.

(6) Purification of water in the field.

GENERAL ORGANIZATION OF THE ARMY MEDICAL SERVICE AND RELATION OF THE MILITARY MEDICAL SERVICES TO THE RED CROSS.

Uzac (France). The series of individual contributions was opened by the report on the general organization of the medical service in the French Armies, by Doctor Uzac, Médecin Principal de 2e classe. The speaker considered in succession: (1) Elaboration of the orders regulating the

activities of the medical service, (2) modification of the activities of the medical service in the different phases of the war; (3) adaptation and employment of the sanitary formations according to the period dealt with. The organization of the medical service underwent a continuous evolution during the war, adapting itself to the conditions in which the war itself evolved. The report aims at giving a picture of the changes of this organization with changing conditions and requirements. At the beginning of the war, the elaboration of orders with reference to the working of the medical service was under the exclusive control of the supreme command to which the directors of the medical service themselves, only authorized to give technical instructions, submitted their suggestions. The latter, naturally, could not always correspond with the intended military operations, because of varying distances between the service chiefs and the command as well as their subordination to an intermediate agent, the director general of communicating lines and services. Measures taken in 1917 placed the representatives of the medical service near the command, the authority of their delegates was increased, and consulting surgeons were appointed. The directors of the medical service interpreted their obligations on the larger scale of investing the representatives of the medical service with greater authority and initiative, as well as developing coordinated activities, with extension of their means of action by telephone and motor car assistance. The service was both improved and simplified through decentralization. As regards the working of the medical service in the different periods of the war, it must be kept in mind that the regulations in force in 1914 referred only to a war of movement and included the systematic evacuation of all the transportable wounded and disabled.

On account of the appalling number of infected wounds through artillery projectiles, the danger of long-distance evacuation with delayed primary wound treatment promptly became apparent. When the war assumed the character of trench warfare in September of 1914, large, well-equipped sanitary formations were created all along the front, where the wounded were cared for as soon as possible after the infliction of the injury and detained until the danger of infection was passed or the wound

had healed. The treatment of war wounds was greatly improved during this phase of the war through knowledge gained at medico-surgical meetings and special courses of instruction in the great surgical services. The limited military operations of 1917 permitted the concentration of a large material of medical officers and sanitary equipment, with an opportunity for close study of the practical use of the latter, greatly to the benefit of the treatment of war wounds. The military operations of 1918 required new dispositions so as to permit the adaptation of the medical service to the anticipated mobilization of the fronts. Up to this time the sanitary formations were placed in a double concentric cordon, consisting of a series of divisional ambulances, having at their rear a cordon of large so-called first-line clearing hospitals, sometimes backed at a very short distance by second-line clearing hospitals. The front ambulance groups, as well as the clearing hospitals, were subsequently reduced, the latter being placed farther away from the front. In addition, large so-called secondary clearing hospitals were established at considerable distance (8 to 10 hours of travel), at points easily accessible by rail, where the transportable wounded were evacuated by entire trains, there to undergo the surgical interventions which could no longer be performed nearer the front. The establishment of these large sanitary formations at the rear, which could be utilized by several armies, permitted the avoidance of the long-distance evacuations, productive of so much harm at the beginning of the war; for by virtue of the new arrangements all wounded could be operated upon within the army zone. These formations were moreover destined to render excellent service for the short-range accommodation of seriously ill soldiers, especially the influenza cases of 1918, or badly gassed soldiers, who at certain periods of the war constituted a high number of casualties which could not be exposed to the fatigue of long transports.

Concerning the adaptation and use of the sanitary formations at the different periods of the war the speaker pointed out that the regulation equipment of military hospitals underwent only slight modifications during the war. The function of the medical service with the troops being essentially one of assistance and first aid, it was discharged in as perfect a manner as possible under human limitations. The personnel of the medical service proved

no less heroic in the discharge of its obligations than the fighting force itself. The transport means of the divisional and corps stretcher-bearer groups, which did most efficient work in the first months of the war, lost in importance with the development of the sanitary motor sections, which permitted a larger scope of evacuation of the wounded and their removal to a safe distance. The ambulances which were originally constructed from an identical pattern, with the object of rendering them interchangeable, promptly became specialized, some being destined for the relief of the wounded and provided with a constantly improving surgical staff and operating equipment, while others served for the care of sick or gassed soldiers. In the course of the first years of the campaign the ambulances worked separately, but from 1916 on they were arranged in larger groups where the technical service was effected under the supervision of consulting physicians and surgeons. The clearing hospital underwent the most important changes. It was a rather small establishment at the beginning of the war, representing the equivalent of two ambulances and having for its special function the reception of the sick on their arrival at the clearing station, the make-up of sanitary trains, the judicious selection and detention of wounded or sick soldiers considered unfit for evacuation in army formations or independent hospital centers.

Due to the inadequacy of local resources, at the time of important military operations or fighting in uninhabited regions, it became necessary to create clearing hospitals comprising not only the services of selective classification of men and formation of sanitary trains, but also the accommodation service, the latter acquiring a capacity which reached two to three thousand beds in certain formations. These large clearing hospitals of the French front, excellently equipped, with capacious surgical motor ambulances, stationary or circulating surgical instruments, and improved sanitary material, undoubtedly represented during trench warfare mighty bulwarks for treatment, benefiting the sum total of the wounded. The existence of these formations was only compatible with a stationary front such as no longer existed after the military events of 1918. The advantages of the large clearing hospitals of the 1916 and 1917 type had proved so obvious that they could still serve as models for the secondary clearing hospitals which later were

erected in the rear in order to receive trainloads of the wounded who could no longer be treated in front formations.

The medical service disposed of certain establishments at the regulating stations, such as local hospital centers, reserve forces of personnel as well as reserve supplies of sanitary material. The proper working of the sanitary trains and adequate performance of the evacuations were dependent upon the activity of the regulating surgeon, his affiliation with the front clearing hospitals, and the territorial distributing stations, his friendly cooperation with the senior railway transport officer.

In proportion to the increasing needs of the armies for the maintenance of the sanitary organizations grew the necessity for concentration of means and for the institution of reserves by deduction from less actively engaged armies, to be placed at the disposal of the fighting armies. These moves of personnel and matériel could only be ordered by an executive in contact with the center of advance information, and the issuing of orders in regard to these moves became the most delicate part of the functions of the representative of the medical service at general headquarters.

Pilcher (Britain).

Col. E. M. Pilcher, C. B., R. A. M. C., made a report on the organization of the medical services and their relationship to the Red Cross, as outlined in the following summary:

1. A forecast in 1913.

2. Organization based upon an expeditionary force of 180,000 men, a great expansion took place but no material change of units.

3. General functions of medical services:

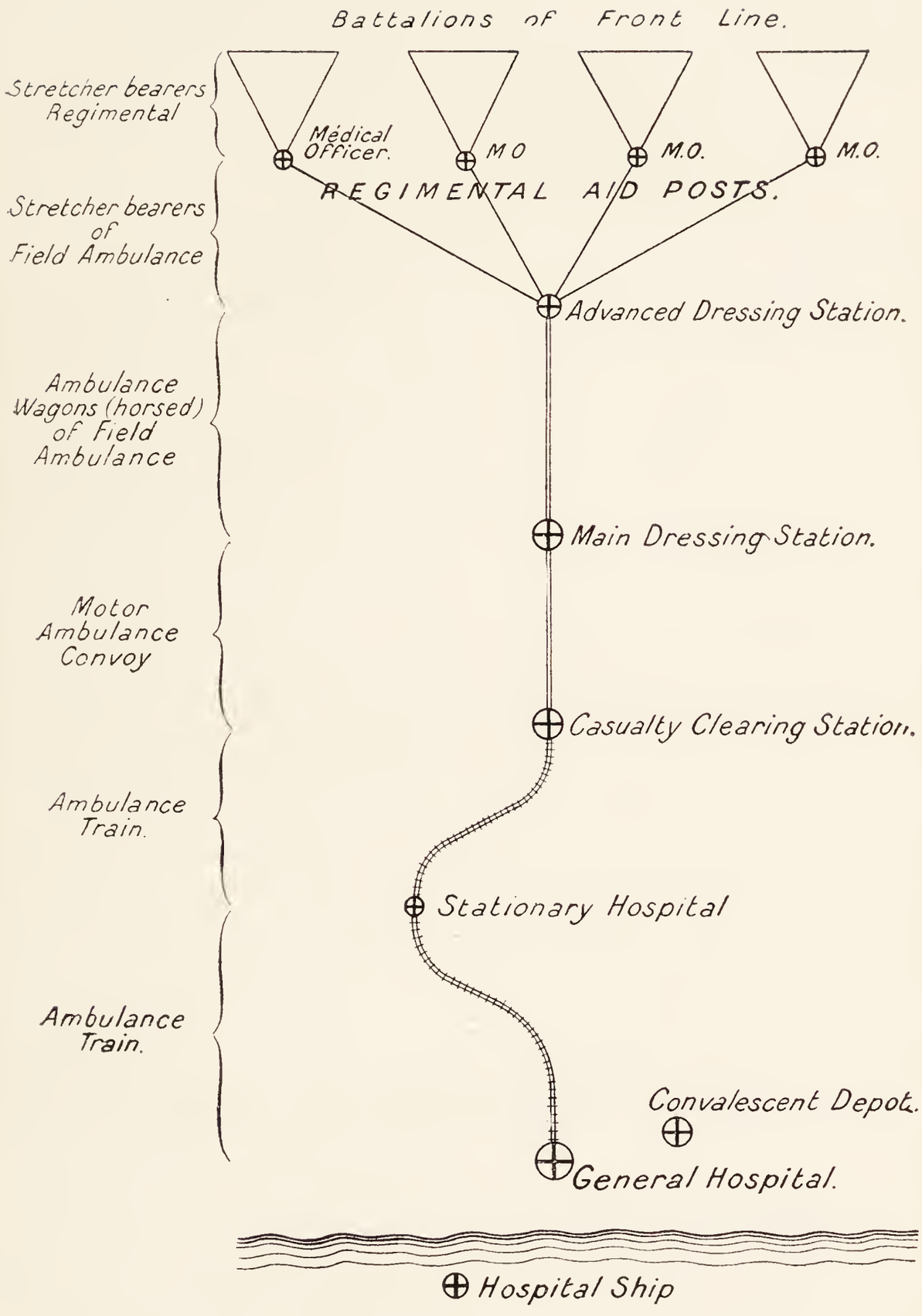
(*a*) Preservation of health of troops; valuable previous experience of preventable diseases; typhoid inoculation; sanitary officers on divisional staffs; regimental sanitary staff; sanitary sections and squads; preventive work a great success.

(*b*) Collection and evacuation of sick and wounded.

(*c*) Professional treatment and care of sick and wounded. British organization expained—diagram.

(*d*) Provision and replenishment of adequate medical and surgical equipment.

4. Comments upon this organization.


Battalions of Front Line.
Stretcher bearers Regimental
Stretcher bearers of Field Ambulance
Ambulance Wagons (horsed) of Field Ambulance
Motor Ambulance Convoy
Ambulance Train.
Ambulance Train.
Medical Officer.
M.O.
M.O.
M.O.
REGIMENTAL AID POSTS.
Advanced Dressing Station.
Main Dressing Station.
Casualty Clearing Station.
Stationary Hospital
Convalescent Depot.
General Hospital.
Hospital Ship

No surgery in parts near front line to be attempted; rapid evacuation to base, where all necessary operations were to be done.

5. Some developments.

One man, one stretcher; improvement in splinting and dressing; formation of motor ambulance convoys; question of surgeons in front line areas; rise of casualty clearing station as a surgical center; formation of convalescent camps as centers of training.

6. The factors which led to these developments.

Influence of character of campaign on medical military units; there should be better coordination between military operations branch of general staff and medical services; also between regular medical services and Red Cross; large number of casualties made modifications necessary.

7. Value of Red Cross organizations.

(*a*) Relationship between Red Cross and regular services before the war.

(*b*) Rules relating to voluntary aid.

(*c*) Lack of coordination before the war.

(*d*) Organization of Red Cross units bad at first, but very helpful later when necessity for coordination was realized.

(*e*) Red Cross units must be an integral part of the Army.

(*f*) Work done by Red Cross societies.

i. Transport.

ii. Provision of medical and surgical equipment.

iii. Provision of gifts and comforts.

(*g*) A good record in transport work, and good results of increase in amount and rapidity of transport.

(*h*) Partial success in supply of personnel.

(*i*) Important work in helping establishment of convalescent camps.

8. Lessons of the war.

At the outbreak of the war, the British Expeditionary Force numbered approximately 180,000, and the organization of the medical services in war was based upon the requirements of this number. Under the progressively increasing demands made upon it, and after prolonged trials, the medical organization emerged with its framework at least unbroken and with the addition to its organization of only one unit, the motor ambulance

convoy. Although modified to suit the needs of an unparalleled type of warfare and enlarged to an enormous scale, the general organization of the medical services did not materially change, nor were its general functions in any way departed from, as shown by a reference to the British field service regulations of 1913. These general functions may be put under the following headings: (1) The preservation of the health of the troops, (2) the collection and evacuation of the sick and wounded, (3) professional treatment and care of the sick and wounded, (4) the provision and replenishment of adequate medical and surgical equipment. The supplies of medical and surgical stores were provided by the establishment of large depots at bases and advanced depots at railheads, the arrangement on the whole working satisfactorily.

With special reference to the relationship of the Red Cross and voluntary organizations to the regular service, there was no coordination with the army medical authorities during peace time, with the result that when the war broke out the Red Cross hospitals, which eventually were of immense help in many directions, were found at first to be insufficiently organized to cope satisfactorily with their duties. Realizing the urgent need of coordination and unity of control, the Red Cross commissioners soon decided that Red Cross units must be an integral part of the Army, and the director general of the army medical service was appointed as chief commissioner. On October 20, 1914, a national scheme of coordination was evolved which enabled the society to meet the increasing demands of the armies by giving it the power of developing its work on lines calculated to secure not only economy and efficiency but the maximum benefit to the sick and wounded, both individually and collectively, whether at home or overseas, in the field, or in hospital. The supply of large numbers of motor ambulance convoys at short notice, provided by the Red Cross Society, made distances appear of less consequence, and with the ambulance trains and the hospital ships very largely influenced some of the subsequent changes in the localization of units and in the treatment of the sick and wounded. It became possible to keep the real base hospitals in England, it made the very existence of a stationary hospital less needful than heretofore, and, above all, it largely

helped to localize and define the real function of a casualty clearing station, a unit over which much controversy has raged but whose usefulness in the war has been repeatedly proved and acknowledged. It enabled this unit to become the first in which the serious wounds so prevalent during the war on the western front could be surgically treated, and as a result compelled it to become not only fully equipped as regards material, but one whose personnel must always include a highly specialized surgical staff. Important work in assisting the formation and establishment of convalescent camps and depots was done by the Red Cross in its capacity as an auxiliary and supplementary organization to the regular medical services.

The speaker, in concluding, expressed the hope that as a result of the lessons, not only of this war but of others, it will be realized that the success of a campaign depends just as much, if not more, on the administration, help, and support given to the medical services as it does upon strategy.

Santucci (Italy).

The general organization of the medical service in the Italian Army, with reference to the administration as well as the practical execution, formed the subject of a contribution to the congress by Generale Medico, Stefano Santucci. This report included an account of the mode of assistance given to the wounded or otherwise disabled men in passing from the front lines to the interior zone. The evacuation of the wounded from the zone of military operations and their collection was described, as well as the creation of specialized surgical hospitals. Measures had to be adopted for the management and prevention of frostbite, in addition to prophylactic measures which were adopted against the spread of infectious diseases among the troops of the fighting army. The water supply to the troops in certain special zones was specially considered by the speaker with regard to the improvement of existing sanitary conditions by physical or chemical means. The desirable relationship in the war zone between the Red Cross and the military medical service formed an important feature of the report.

Van Baumberghen (Spain).

In addressing the congress on the subject of the organization of the medical service in the armies, Dr. A. Van Baumberghen, Médecin-Major de l'Armée Espagnole, proposed the adoption of general rules of international

character. in certain details. without interference with the initiative of each nation in developing its economic resources in the most appropriate fashion and in disposing of the same independently. For example, a single diagnostic card or wound tag would simplify the service, increase the well-being of the soldier, and permit the transference of the wounded into other hands without the need of another professional visit. The nature of the wound, as stated on the card, would indicate the route to be taken by the patient. In this manner, the difficulties of transportation would be easily solved. and the patients would be protected against hardships. One of the principal advantages of this agreement would consist in the avoidance of the difficulty of communicating with patients whose language is not understood. All medical officers and army surgeons should wear a single distinguishing mark.

Van der Smissen (Belgium).

Belgium's contribution to this subject at the congress came in the form of a report by Dr. A. Van der Smissen, Médecin principal de 1re classe, on the general organization of the medical service in the armies, and on the relations of the military medical service with the Red Cross. The latter was virtually suppressed by the abandonment of nearly the entire Belgian territory in October of 1914. A few isolated physicians, however, followed the army in the field and organized hospitals behind the front of the Yser. One of these hospitals created in La Panne, by Doctor Depage, was a veritable model. Unfortunately the resources of the Red Cross in regard to personnel were nil—aside from the small number of eminent individuals who had taken the initiative of founding hospital establishment—so that the army was obliged to lend the Red Cross a part of its physicians and all the necessary attendants. War experience has accordingly shown that the connection of the Red Cross with the medical service of the army needs to be reorganized on a new basis. The chief rôle of the Red Cross must be to meet its peace-time obligations, through the creation of hospitals, dispensaries, sanatoria, and similar institutions. On mobilization, the medical service of the army can meet the requirements of the first days of warfare by its mobile formations and its extended stationary hospitals; but the influx of the wounded will soon exceed its possibilities, and here the intervention of the Red Cross must manifest

itself in an efficient way, through the contribution of all the hospital resources which it has pledged itself to furnish since peace time. A certain number of completely equipped hospitals, as regards personnel as well as material, should be placed at the disposal of the ministry of national defense, to functionate as military hospitals. The Red Cross should also be charged in peace time with the training of auxiliary nurses, as required in the military hospitals for the needs of mobilization. Other resources of the Red Cross may be called upon in behalf of the health of the civilian population. The new statutes of the Red Cross in peace time justify the hope that it may become a wonderful instrument of hospitalization in war time, and that its connection with the medical service of the army will prove of valuable assistance in the stupendous task of the latter.

Chuan (China).

A history of the Chinese military medical service was given in the interesting contribution made to the congress by Surg. Gen. S. A. Chuan, president of the Army Medical College at Peking.

The speaker briefly reviewed the primitive conditions existing in the old Chinese Army and the reformation of the military and medical service through the contact of China with the West. Military medical service first began in the navy; the first two military hospitals were established in Port Arthur and Weihaiwei, the two chief naval bases in north China. Medical officers of these hospitals had been trained by the Peiyang Hospital in Tientsin, out of which later came the Peiyang Medical College, now known as the Navy Medical College. The Army Medical College was founded in Tientsin in 1902 for the proper training of medical officers and subsequently became a national institution. The first class was graduated from it in 1906, and the men were immediately appointed as medical officers for the different army corps. A department of pharmacy was organized in connection with the Army Medical College, and in 1908 the first class of graduated pharmacists were distributed to the different army corps. In the same year an army medical supply depot was established. China sent out for the first time her accredited representatives to the Thirteenth Annual Army Medical Convention in the United States.

As emphasized by the speaker, these changes illustrate the progress of the army medical service and the impor-

tant position it came to assume in the army. The medical personnel was given definite rank in 1905 by the general headquarters for army training with the title of brigadier general as the ranking officer for the doctors and colonel for the pharmacists. During the revolution in 1911 most of the medical officers in the opposing armies were graduates of the Army Medical College. In 1912, the first year of the Republic, final ranking of medical officers was decided upon; doctors have since held ranks from major general to second lieutenant, and pharmacists from colonel to second lieutenant. Below these are male nurses as noncommissioned officers, and nursing orderlies as soldiers. Provincial army medical departments were established for the direction of the army medical affairs of the Provinces under the control of the national medical department in the war ministry. The present rules concerning the public health of the army provide for army medical education of special companies and include plans for the prevention of contagious disease, physical examination, and duties at the regimental medical headquarters, and the education and training of stretcher bearers.

The development and progress made by China in military medical service may be divided into these four periods: Prior to the Chinese-Japanese War; from the Chinese-Japanese War to the Boxer movement; from the Boxer movement to the Revolution; and since the Revolution. Although much creditable work has been accomplished, a great deal still remains to be done, but with increasing trained personnel and better supplies the speaker expressed the hope that China would soon place her army medical service on an appropriate basis.

Hybbinette (Sweden).

In giving a brief review of the organization of the medical service in the Swedish Army during peace time, Dr. R. Hybbinette, Médecin de Bataillon, the delegate from Sweden, explained that the army medical service is under the direction of the army administration, which constitutes the supreme military authority from the administrative viewpoint under the department of national defense. The departments of terrestrial and naval defense have been united in a common department since 1920. The direction of the medical service constitutes a common administration for the medical and veterinary services of the Army. The head of this central service is the "Generalfältläkaren," or chief military surgeon,

who is also the chief of the entire medical personnel of the army. The direction of the medical service is assisted by a scientific advisory board, composed of a certain number of specialists in different lines (actually 22 in number) with the mission of giving advice and directions in the corresponding special branches when required.

The surgeons of the reserve of the medical corps are held to serve in war time or when the troops are called out for the defense of the country. Although the position of military surgeons is somewhat complicated, there are practically no restrictions to interfere with their right of attending to a civilian clientele in a measure compatible with the exercise of their functions in the army. Since 1916, the army, in addition to its male hospital attendants, also possesses a permanent corps of female nurses, to the number of 42, not counting those who figure on the staffs of important garrison hospitals. These nurses are at present considered as indispensable. Every corps has its own hospital or at least its section of a hospital. In important garrisons, such as Stockholm, Skovde, and Boden, there also exist special garrison hospitals provided with entirely modern sanitary equipment, in which are treated the majority of grave cases supervening in the respective garrisons. Under ordinary circumstances there are no special sections for slightly sick soldiers, and men who can not be easily cared for in a sanitary establishment of the army are evacuated into a civilian hospital. Special methods of treatment have in recent years shown a progressive tendency toward a permanent organization, so that specialists attached to the military hospitals as well as to the special sections of the Stockholm Garrison Hospital are always available and may be summoned as required, or the patients may be sent to them when this is practicable. A question on the order of the day is the eventual fusion of military and civilian hospitals, more particularly the garrison hospital and the Seraphine Hospital in Stockholm. The odontological service in the army is attended to, as far as permitted, by available resources, by appointed civilian dentists in certain important garrisons, and at certain times by the enlisted dentists during the last portion of their military service. There are no real military dentists and pharmacists. The same is true of military pharmacies, except that the Stockholm gar-

rison hospital possess a special military pharmacy which supplies the entire garrison and is under the management of a civilian pharmacist.

The medical service of the Swedish Navy is still separate from that of the army, but an approximation between these two branches of the medical service of national defense is to be anticipated as a result of the above-mentioned fusion of the two departments into a single one. As regards collaboration with the Swedish Red Cross, the chief military surgeon assists at the meetings of the supreme council of the Red Cross, and a certain number of other military surgeons actively cooperate in Red Cross work. War-time collaboration between the medical service of the army and the service of voluntary associations is carefully regulated by provisions of a confidential order.

Kensa Oyama (Japan).

Surg. Lieut. Col. Kensa Oyama addressed the congress on the general organization of the medical department of the Japanese Army, stating that the medical department has 1,321 officers in active service, making the ratio as 1.38 as compared with over 50,000 physicians in Japan. All medical officers are members of the Military Medical Association or sanitary corps, whose president is the director of the medical bureau of the department of war. This director is the surgeon general who is the head of the medical department of the army. The bureau is divided into two sections, that of general administration and of medical service, the chiefs of both being surgeon colonels. The chief of medical affairs at divisional headquarters is a surgeon general or colonel, who controls all sanitary concerns as well as the education of medical officers and noncommissioned officers of his division. A number of female nurses are employed at the garrison hospitals. In war time the divisional medical corps includes a stretcher company. There are 81 garrison hospitals, which are classified into four grades. Each hospital comprises several wards devoted to internal medicine, surgery, ophthalmology, oto-rhino-laryngology, cutaneous and venereal diseases, infectious diseases. The education of medical officers is completed, after their appointment, by the study of military medicine and surgery in the Military Medical College, which is presided over by a surgeon major general, a number of medical and pharmaceutic officers serving as instructors. The bacteriological section of the college, besides investigating

the prevention of epidemic diseases, prepares vaccines for the treatment of typhoid fever, paratyphoid, cholera, dysentery, plague, and influenza, as well as vaccine lymph, and the antisera of erysipelas and tetanus. Five military sanitaria, three in the mountains and two by the seaside, belong to the Japanese Army.

Connerade (Belgium).

In his report on the organization of the chemical services in the Belgian Army, Dr. E. Connerade, Pharmacien de 1re classe de réserve, Professeur a la Faculté Technique du Hainaut, warned against the threat of the chemical industry of Germany, which is now preparing for a dangerous increase of poisonous fluids for use in the next war. Realizing the uncertainty of peace, and the importance of the part allotted to the chemical sciences in military preparedness, all the great Allied Nations are contemplating the formation of a permanent chemists' corps in the army. Belgium being exposed to the most serious risks, it becomes the duty of the authorities to provide efficient defensive measures, which must necessarily include the new technical organization referred to above. In addition, the speaker proposed the erection of a well-equipped central laboratory for chemical investigation and experimentation, supplemented by lecture courses in applied physical and organic chemistry for the instruction of military chemists about to join the active army.

The work of the staff, composed of professors of chemistry and their assistants, is to consist in the study of all the important chemical problems which will be placed before them. So-called "circumscriptionary" or local laboratories must be established, having for their principal object the control of the army's food supply; and every hospital must be provided with a laboratory of clinical biochemistry. In the case of mobilization, a chemist is to be detached for service with the ministry of war and another for service at the general headquarters of the army. The central laboratory is to be maintained, and its staff extended by mobilized university professors and assistants, the direction of the different sections being intrusted to the most competent men. Each army division is to have a field laboratory, including a stationary research section, a movable hydrological section with several stations, and a movable defense section against poisonous gases. A military chemical pharmacist is to be detached for service with each

regiment, to attend to the distribution of the antigas masks. The proposed laboratories of clinical chemistry are to be attached to the hospitalization centers and the movable hospitals.

Hansen (Denmark).

The organization of the medical service in the Danish Army was discussed before the congress by Doctor Hansen, Chef d'Etat-Major du Service Sanitaire de l'Armée Danoise, who showed that the medical personnel of the army consists of military surgeons and medical staff. The medical corps contains both regular and auxiliary military surgeons. The chief of the military medical service is the chief of the corps, with the rank of major general, and directly under the war ministry. He directs and inspects the medical organization and sanitary equipment of the army. The two senior first class chief surgeons have the rank of colonel, the others are lieutenant colonels; two are attached to the supreme army command, one is chief of the staff, one is chief of the garrison hospital in Copenhagen, and two are at the disposal of the army corps, one of them being chief of the sanitary depot. All surgeons are subservient to the medical corps, which is alone authoritative in medical questions, while other questions are decided by the commanding general of the district where the surgeons serve. They supervise the sanitary work and take care of the sanitary material delivered to the service. According to orders of the supreme command or on its authorization, they inspect the sanitary service and all that belong to it in the garrisons of the district of this command. At a time fixed by the medical corps, they prepare an annual inventory of the sanitary equipment of the different divisions and hospitals. Instructive exercises, so-called war games, and exercises in sanitary tactics, with or without apparatus, personnel, and material, are held by the regular surgeons who serve in the divisions and hospitals, the schools, the training schools for nurses, and other centers.

Military surgeons have the right to practice and to have a civilian clientele, their doing so being considered as actually in the interest of the army. The garrison of surgeons is not altered except on their own desire, so as to protect their practice. Medical students who have finished a certain part of their studies are taken for military service in the medical corps, where they serve

during a period not exceeding six months. As soldiers, they attend a school for auxiliary surgeons during about six weeks. The military and medical studies of this school are concluded by an examination, after which the soldier is attached to a service in a division or hospital where the regular surgeons supervise the continuation of his medical service. In normal times the service as auxiliary surgeons lasts about two and a half months. The students may be recalled in the fourth year of their medical studies to continue their medico-military training for a period of 25 days. In war time the auxiliary surgeons may be charged with a regular service. Auxiliary surgeons who have completed their medical studies and passed a medical examination, and who are found efficient, may on request of the medical corps be raised to the rank of major adjutant surgeon by the ministry of war. In order to train as large a number as possible, these major adjutant surgeons do not as a rule serve longer than two years in the divisions and hospitals conducted by the regular surgeons. The sanitary troops are dependent upon the medical corps and consist of hospital attendants, ambulance surgeons, ward nurses, and stretcher bearers. The corps of female army nurses is also under the medical corps.

Every garrison has its own military hospital, the Copenhagen Garrison Hospital having services for all diseases except insanity which is treated in civilian hospitals. There is a medical service, a surgical service, a service for cutaneous and venereal diseases, eye diseases, diseases of the respiratory passages, ear and nose, one for gynecological diseases (wives of members of the army and their families), a service for Röntgen examination and treatment, and one for dental treatment. All these services are connected with clinics for ambulant treatment. Then there is a military epidemic service for epidemic and tuberculous diseases, the latter being treated provisionally before evacuation into a sanitarium or discharge from the army.

In war time, in order to have enough space, certain buildings are designated for possible utilization, and a detailed plan is worked out for each building, for its rapid transformation into an ambulance with services for surgery, medicine, and epidemics. During peace the army, as well as the navy, have certain relations with the

Red Cross. A military surgeon with whom the Red Cross may discuss questions is delegated by the army and navy, and the results must often be sanctioned by the war ministry. On mobilization the Red Cross becomes subjected to the supreme command of the army.

Dzierzkowski (Poland).

A brief communication on the organization of the corps of sanitary troops in Poland was presented by Captain Doctor Dzierzkowski, the Polish delegate to the congress. Although the medical service is not yet completely organized, certain points still waiting for definite settlement, the bases of the organization are already firmly established, and the final achievement is only a question of time. In order to meet the many duties now incumbent on the medical service of a modern army, the Polish medical service has found it necessary to establish its organization on the basis of the two following rules: (1) Complete autonomy, permitting it to dispose of all the necessary means for the proper functioning of all parts of its mechanism; (2) the closest and most direct cooperation with the supreme command, as indispensible to coordination, especially in war time, of the sanitary measures with the work of other services under the same command. This goal was attained through the creation in 1919 of a corps of sanitary troops, according to a decree issued by the supreme command. In order to make collaboration profitable, it is indispensable for surgeons to acquire a sufficient military education, thus enabling them to do efficient work in the staffs of the great units. For the higher officers of the sanitary troops the Polish Government has therefore organized so-called staff courses, where the necessary instruction is given them.

Antonin and Balanesco (Rumania).

General considerations on the organization of the Rumanian medical service during the war (1916–1919) were the subject of an address by Dr. L. Antonin, Médecin Général de Division, inspector du Service Sanitaire de l'Armée Roumaine, and Lieutenant Colonel Doctor Balanesco. This service, as pointed out by them, underwent a series of modifications during the years 1914, 1915, and 1916, more radical changes in 1917, and a third series during the Hungarian campaign, 1919–20. The service was thus shown to be in a state of continuous transformation. Their anxiety to take the best possible care of the wounded and disabled impels the chiefs to take advantage of all new methods along special lines. Technical surgical organization appears so imperative that it is neces-

sary to hold interallied surgical conferences. In order to keep in touch with modern scientific advances and being desirous of organizing for the wounded the application of the new methods of treatment in use in the temporary Compiègne Hospital No. 21, the Rumanian medical service requested from the French Government a mission of French surgeons, which was accordingly sent, directed by Dehelly, with great benefit to the wounded. With special reference to prophylactic measures a high degree of foresight was attained, especially in the second period, 1917–18, in the form of movable prophylactic outfits, stationary and movable bacteriological and chemical laboratories, hospitals for contagious diseases, quarantines, stationary and movable vermin-destroying contrivances, sanitary regulations of soldiers' camps, and other improvements.

The Rumanian Red Cross lent its extensive cooperation to the army as well as the civilian population during the war. It placed at the disposal of the army 50 stationary hospitals with nearly 11,000 beds and 5 field hospitals with 1,000 beds. The entire medical personnel in its service was considered as mobilized and was placed under the technical control of the military medical service. After the evacuation of Valachia it was charged with the administration and maintenance of all military hospitals (150 in number) left in the occupied territories. In these hospitals 150,000 wounded and sick were cared for by the Red Cross. The humanitarian work of the Red Cross was assisted by the unfailing activity of Her Majesty the Queen of Rumania, and also by the Red Cross societies of allied or neutral countries (American, British, Canadian, French, Swiss, Swedish, Danish, and Japanese Red Cross). The International Committee of the Red Cross was undoubtedly equal to its mission, as shown by the assistance lent on all occasions.

Chuan (China).

China, through her delegate, Surg. Gen. S. H. Chuan, sent a brief report on the Chinese army medical service with the activities of the Chinese Red Cross. On account of the limited number of medical men in this country, the relations between the army medical service and the Chinese Red Cross have always been very close and cooperative. Some of the cooperative activities are represented by the fight against the so-called famine fever, and the pneumonic plague in Manchuria in 1910, which was waged by all available medical men in the army and

navy, the Red Cross, civilians, foreigners, and Chinese. The second united activity concerned relief to the population of Wen-Chou and vicinity in 1913, at a time of inundation. Two years later, in 1915, the metropolitan Province[2] was devastated by an enormous flood, and the outbreak of epidemic of infectious diseases was efficiently prevented by the work of 120 medical officers assigned to duty by the army medical service. An extensive outbreak of pneumonic plague in Sui-Youan, district of Mongolia, the infected areas covering 10,000 square miles, was efficiently checked in the short period of four months by the antiplague work of the army medical service, as discharged by 136 medical officers headed by Surg. Gen. S. H. Chuan. In the recent famine (autumn of 1919), affecting four of the most densely populated Provinces of north China (about 30,000,000 people), the need of sanitary relief proved imminent, and the International Famine Relief Committee appointed the speaker as medical director for the whole of the famine-stricken districts. Five sanitary squads were organized, consisting mostly of army medical officers, and four sanitary stations were established in the important centers. The threatened epidemics were efficiently checked as a result of the activities and services of these medical stations and sanitary squads.

Uzac and Vincent (France).

France presented a valuable contribution to the congress in the form of observations by Doctor Uzac, Médecin Principal, and Doctor Vincent, Médecin Major de la Direction du Service de Santé au Ministère de la Guerre, on certain means of transportation of the wounded. A number of considerations were pointed out as indicating the systematic establishment of the surgical services at the rear for all wounded men who can tolerate without harm a transportation of about 10 hours. Only those casualties which can not be transported or evacuated are to be kept in the proximity of the front. This arrangement necessarily involves the employment of improved means of transportation, and as these conditions change for the better the number of absolutely untransportable cases will presumably become considerably reduced. The utilization of sanitary automobile vehicles meant an enormous advance from the viewpoint

[2] The metropolitan Province of China is Chili (formerly called Pechili) which means "direct rule," and is so called because it is the Province in which the national capital, Peking is situated. It is the most northerly of the six maritime Provinces of China proper and has an area of 115,800 square miles. The population of this Province was estimated at about 32,571,000 by the Chinese census of 1910.—W. S. B.

HON. ALBERT DEVEZE, MINISTER OF NATIONAL DEFENSE OF BELGIUM, WHOSE VISION AND LEADERSHIP WERE LARGELY RESPONSIBLE FOR THE CALLING OF THE CONGRESS.

962–1

COLONEL VAN DER SMISSEN, DIRECTOR GENERAL SERVICE DE SANTÉ, WHO REPRESENTED THE BELGIAN MINISTER OF WAR THROUGHOUT THE CONGRESS.

962–2

LIEUTENANT GENERAL WILMAERS, ONE OF THE LEADERS IN THE CONGRESS.

962–3

INSPECTOR GENERAL WIBIN OF THE SERVICE DE SANTÉ OF THE BELGIAN ARMY, WHO WAS ONE OF THE GUIDING SPIRITS OF THE CONGRESS.

962–4

of efficiency, rapidity of evacuation, and actual comfort, as compared to the old horse-drawn carriages. There is still room for improvement, however, especially as regards the comfort of the wounded (by springs and air cushions), as well as better methods of heating, a very important consideration for war-wounded men, who must be transported in a state of shock. The utilization of sanitary airships as a means of transportation has already been initiated on a limited scale in certain theaters of war, and would seem to promise good results in the evacuation of wounded men under the best possible conditions of security, rapidity, and comfort.

Baduel (Italy).

The work of the Italian Red Cross during the war (1915–1918) as an auxiliary of the military medical service was discussed before the congress by Surg. Col. Prof. Cesare Baduel, general director of the Italian Red Cross. In describing the activities operative in the war zone, the speaker showed that since the entrance of his country into the war, the Italian Red Cross mobilized 209 units, subdivided as follows: Sixty-five war hospitals under canvas, 3 stationary hospitals, 3 movable surgical hospitals, 4 sanitary sections, 32 mountain ambulances, 80 railroad aid posts, 24 hospital trains, 15 automobile sections, 3 field sections for volunteer female nurses, 1 lake ambulance, 1 river ambulance, 6 radiological ambulances, 1 electrovibratory ambulance, 4 movable douche baths. For the services of these and other units, including a laboratory for medical research, the Italian Red Cross mobilized the following personnel: 2,225 medical officers, 1,080 volunteer female nurses, and 9,500 military attendants, male graduate nurses, and soldiers. The field hospitals had an original capacity of 50 beds, which was almost immediately increased to 100, and in some cases to 200 beds, so that 10,000 beds could be provided in the war zone. These hospitals were supplied with bacteriological laboratories, radiological cabinets, apparatus for disinfection and sterilization, etc. Altogether 426,786 patients were received by these hospitals. The movable surgical hospitals were highly important formations, capable of rendering the most up-to-date assistance in war surgery, and doing an enormous amount of work. Aside from minor interventions, amputations, or disarticulations, which were performed in large numbers, the list of operations done in these hospitals in-

cludes 694 laparotomies, 612 craniotomies, 45 laminectomies, and 60 thoracotomies. Very important services were also rendered by the 24 hospital trains, which from the start could transport 206 wounded in the recumbent position, later on, 300. This service proved so satisfactory that the military medical service has modified its own sanitary trains according to the modern type of the Red Cross trains. Altogether, 835,501 military passengers were carried by these trains in approximately 4,572 journeys, covering a distance of about 2,824,519 kilometers.

The Italian Red Cross was always very closely connected with the military medical service, and in entire conformity with the purposes of the latter, the Red Cross participated in all the tasks belonging to the medical and sanitary domain up to the front-line service. His Majesty, the King of Italy, decreed the silver medal for military bravery to the Italian Red Cross, with the following commentary: "In accomplishing its most noble mission of mercy, it has shown during the entire war an admirable spirit of devotion, a generous zeal, undaunted courage, and constant devotion to duty." Concerning the actual relations of the Italian Red Cross with the military authorities in warfare and peace time, its statutes place the Italian Red Cross always at the disposal of the ministries of war and of the navy, whose represenatives are by right members of the central committees and the directory council. The Royal Decrees of December 14, 1919, Nos. 2469 and 2470, regulate at present the activities of the Italian Red Cross Association in warfare and in peace time, its relations with the war ministry, the administrative and executive duties of the military medical authorities in the war zone and territorial zone, the legal position of the Red Cross personnel in case of mobilization by order of the military authority. By a Royal Decree of October 17, 1920, following the proposal of the war ministry, his Majesty, the King, has granted to the Italian Red Cross a "labarum" as to the other army corps. (A "labarum" is a standard or banner borne in ecclesiastic processions of the Roman Catholic Church, emblematic of spiritual goal and guidance.)

Depage (Belgium).

The advantages of accurate organization of the medical service, more particularly its organization in "sectors," were emphasized by Doctor Depage, who laid stress on the fact that the Red Cross has become mili-

tarized and can be intrusted by the medical service with the care of a certain number of "sectors" according to conditions established in peace time. A "sector" consists of a series of hospitals, constructed at distances from the front toward the rear, placed under the direction of one surgeon belonging to the general inspectorate of the medical service. In the speaker's opinion, each sector should be autonomous, and its personnel movable from one hospital to another, according to requirements, on order of its chief.

D'Espine (Switzerland).

International Red Cross Committee: Dr. Adolphe D'Espine, Ancien Recteur et Professeur Honoraire de l'Université de Génève, stated that he was delegated to the congress because the latter had placed the relations between the military medical service and the Red Cross on the program. While each National Red Cross society must arrange its exact part in warfare in conformity with its government, the International Committee, which these societies recognize as their natural center, welcomes for them the privilege of serving at the front instead of restricting their activity to formations at the rear. The idea of the Red Cross, it must be remembered, was conceived on a battle field, at Solferino. Recent war experience has shown its efficiency at the front, when help was needed. On the occasion of a visit to the Italian front in May, 1917, the speaker saw advanced posts and ambulances of the Italian Red Cross under the direction of prominent surgeons and university professors who operated upon the wounded two hours after the infliction of their injuries at Monte Luka.

LESSONS OF THE WAR IN THE TREATMENT OF FRACTURES OF THE LIMBS.

A number of useful contributions were offered at the congress on the important subject of treatment of limb fractures. The armies and navies of many nations were represented by the speakers.

Levit (Czechoslovakia).

Czechoslovakia brought a valuable offering in the form of a review by Dr. J. Levit, commandant médecin, professeur agrégé à l'Universitié Charles à Prague, on the modern treatment of fractures. The ideal aim and object of fracture treatment must be the perfect anatomical and functional result. In order to accomplish this object, the first requirement is exact coaptation; next, the preserva-

tion by different methods of joint mobility, restoration of muscular function, and elasticity of the soft parts in general, by means of orthopedic measures. Surgical procedures consisting in exposure of the fragments and fixation in a variety of ways, are resorted to only in case with considerable displacement, and where small benefit is to be expected without an open operation. Mechanotherapeutic measures must be utilized after these operations, as well as in all other cases, in order to accomplish good results. This observation was made in the speaker's surgical division, when an entirely modern orthopedic section was attached to it through the efforts of Colonel Fischer, chief of the sanitary section of the ministry of national defense. No soldiers with fractures were discharged until after the maximum possible restoration of the function of the limbs was obtained.

De Souza Fereira (Brazil).

The delegate from Brazil, J. A. de Souza Ferreira, major médecin of the Brazilian Army, emphasized the need of prompt attention to war fractures, the surgical treatment to consist of thorough disinfection of the focus, according to modern methods of wound treatment (débridement). The fractured bone itself is to be treated according to the technique of partial progressive removal of the splinters, as governed by the requirements in each case. Recently acquired knowledge of osteogenesis—having shown that bone produces bone exclusively—apparently accounts for delayed consolidation, up to the establishment of pseudarthrosis, sometimes observed as a sequel of extensive subperiosteal removal of bone splinters. The orthopedic stage of rational fracture treatment must follow a parallel course with surgical interventions, and primary wound closure is to be judiciously extended to wounds complicated by fractures, in order to facilitate orthopedic procedures and promote favorable healing.

Special ambulances for fracture treatment have shown their value in improved therapeutic results, and should be permanently attached to the sanitary formations in time of war. Continuous extension, by means of modern appliances, had very satisfactory results in the experience of all who utilized this method which at the same time secures most reliably the perfect adjustment of the fragments and subsequent fixation. The Thomas splint was found to be an excellent apparatus for the transportation of soldiers with fractures.

In the treatment of fractures the rational application of osteosynthesis is capable of furnishing the best results for direct adaptation and subsequent immobilization of the fragments. T-shaped fractures of the epiphysis, certain fractures of the fore arm, patella and femoral neck, as well as those with three or four fragments, indicate the necessity for primary bone suture. The only prostheses employed during the war were of metal and were usually temporary. Procedures described as hooking, spiking, circling with hoops or on the Tarham blade, and screwed plates were utilized. Repeated open operations are at present guarded against in suitable cases by useful stationary prostheses. Osteosynthesis is an operation requiring the most rigorous asepsis, appropriate instrumental equipment, and last but not least a skilled and experienced surgeon. Attempts have recently been made to replace metallic prostheses with a substance which is prepared from bone and can be gradually aborbed.

Physiotherapeutic procedures must be instituted early, and gradually increased until active movement of the limbs can be attempted. Immediate walking, as permitted by Delbet's apparatus, improves the functional recovery of the limb, and is advantageously carried out as soon as possible. Passive and active mobilization of the joints must be instituted at an early date.

Cooperation between surgeon and radiologist in the treatment of war fractures has proved extremely valuable in securing an accurate diagnosis and good bone repair. The effect of the treatment should be controlled radiologically by means of a portable apparatus which can be transferred to the bedside. A selection of some of the best among a great variety of fracture appliances which were designed during the war would seem to be desirable, in order to standardize modern fracture apparatus for general adoption in the army surgical service.

Pilcher (Britain).

Col. E. M. Pilcher, C. B., R. A. M. C., in his exhaustive contribution on lessons of the war in the treatment of limb fractures indicated the point from which the British Army started in its treatment of fractures and the modifications in that treatment in the light of the new and tremendous experiences. The contrast between the experience of former campaigns and the World War was dwelt upon by the speaker, who stated that British surgical opinion, and the consequent preparation made, as exemplified in the British field fracture equipment.

was founded largely upon experience in the South African War. The great majority of the wounds inflicted in that war were due to the blunt-nosed, small-bore bullet. Shell fractures were uncommon, and no high degree of septic infection occurred, on account of the small use of artillery and the clean prairie soil of the battle fields. Measures to meet sepsis accordingly took a secondary place.

With the advent in the World War of an overwhelming artillery predominance, a pointed bullet producing enhanced injury both in bone and soft parts, and a high degree of infectivity in the soil of the country fought over, problems in connection with bone injury took a somewhat different aspect. It soon became clear that fractures no longer conformed to any particular type of bone injury, but were highly irregular, and above all that it was not safe to assume that any wound was free from infection or so lightly infected that it could be left to nature. Shell fragments have always had a bad reputation as introducers of septic material, putting aside the fact that they often lodge in the tissues and carry in foreign bodies and portions of clothing. And the relatively sterile rifle or machine gun bullet was usually infected by passing through earth or the mud-stained clothing of the soldier.

Another tactical feature, which was the direct outcome of the supersession of open warfare by the conditions of trench fighting, was the close range at which rifle and machine-gun wounds were inflicted. Bone wounds were formerly divided into types exemplifying long, medium, and short range injury. In trench warfare, ranges are usually short and bone injury therefore maximal. A large proportion of exit wounds were of the explosive type.

Again, the change from the round nosed to the pointed bullet had all the results predicted from experiment. A much higher degree of shattering was seen, whether in compact or cancellous bone, and whereas cancellous bone was usually, and compact bone occasionally, tunneled by the round-nosed bullet, the pointed bullet was equally destructive to both, and clean tunneling, the "plaie en seton" of French writers, rarely seen.

Trench conditions of warfare also were certainly responsible for a greater number of richochet hits. M.

Delorme estimates their frequency as occurring in a proportion of 1 to 3. Whether we accept this high figure or not, it must be allowed that the oblique and lateral impact of bullets fired at short range, and losing only a small increment of their velocity by contact with loose earth and the like, was certain to lead to enhanced severity of bone wounds.

Surgeons were to some extent prepared for a state of things in which gunshot injury to bone was likely to be more severe than that to which they were accustomed, but little preparation had been made to deal with injuries in which the most terrible types of infection were hidden and in which the most extensive shattering was of less importance than gangrenous processes of a rapidly spreading and lethal character. All former ideas were upset and at first the preparations seemed inadequate. Surgeons had to tackle at once and from the beginning, the question of dealing with immense numbers of shattered and highly infected bones, chiefly at or near the front, as the battle against septic processes admitted of little delay.

Probably, therefore, the most important knowledge gained during the war in the treatment of fractures was the *realization of the true nature of a gunshot fracture.* A perusal of the reports published by the war office after the South African war shows clearly the point which has been referred to above, that the importance of the accompanying wound was considered secondary to the nature and degree of the fracture. Excellent descriptions and classifications of bone fractures are given. Curiously enough, too, it is fully realized that sepsis "threatens the life of the patient and necessitates amputation in the vast majority of cases requiring that operation. Everything else sinks into insignificance beside it, and a fracture presenting the highest degree of comminution is, if aseptic, of less moment than a trivial one in which suppuration has occurred." But this recognition and acknowledgment of the dangers of sepsis did not lead to their logical consequence, viz, the administrative attack upon sepsis. It was, as a matter of fact, hardly recognized that septic material was carried in by the missiles to the deeper parts of the wound and could not be influenced by any form of external antiseptic treatment. Attention was concentrated upon the bony fracture and not on the wound.

This fact emerges in the discussions which are recorded as to the advisability of exploring gunshot fractures and removing fragments of bone. The considerations in the minds of surgeons on this procedure were not connected with the removal of septic tissues but of bony fragments. It was the fracture and its repair which were the first consideration. It was reserved for the late war to teach us the fact that the septicity of the wound is the chief factor upon which depends the future of bone repair and the incidence of hemorrhage; and this sepsis is under the control of the surgeon and is capable of elimination, and that the questions connected with esquillectomy are of secondary though high importance.

The lessons learned in the front areas—that is, from trenches to operating area—were:

1. The application of external antiseptics, and even the attempt to treat the deeper parts of wounds with antiseptics, is useless. Rapid general cleansing of the skin and the application of dressings is all that can be done.

2. The treatment of hemorrhage is essential in the front area and should not depend upon the tourniquet, except in the actual trenches, but should have as its ideal the ligature of both bleeding ends in the wound.

3. As pathological research has shown that infection follows implantation of septic material within a few hours, it follows that complete surgical revision of a wound is necessary as soon as possible. All means, therefore, of facilitating the patient's dispatch to an operating center should be used. In the case of tetanus and possibility of some other infections, early serum-therapy should be carried out.

4. Severe shock justifies the retention of a wounded man for a few hours in the front-line area for treatment by warmth, the infusion of saline or gum solutions, sleep, and the firm fixation of his shattered limb.

5. The means of fixation in the front-line areas should be simple and efficacious. For the upper limb, splints are sometimes unnecessary. The arm, in the case of a fractured humerus, can often be bound to the side, or it can be put up in a modified Thomas splint with a swivel ring. In the case of the leg and thigh practically all wounds can be put up in a Thomas splint with as little disturbance of boots or clothing as is consistent with a thorough examination and dressing of the wound.

There is a small proportion of gunshot wounds of the thigh in which, owing to the position of the wound, the ring of the Thomas splint can not be applied. For these the long Liston's splint is applicable and the feet should be tied together so that the foot of the uninjured limb may keep the injured one from rotating outward, as it tends to do in a jolting ambulance.

Surgical interference at the seat of fracture was not popular in the British armies. The rule was to remove bone obviously separated from its surrounding and likely to die; but fragments still united by periosteum were left alone. The ends of the bones and their medullary cavities were not interfered with. This is in accordance with English teaching and was not much modified by the advocacy of primary esquillectomy in France.

Amputations at the casualty clearing stations were life-saving measures and had not much relation to the fracture itself. They had less relation still to considerations which became potent at a later stage. The kind of stump left after the amputations and its adaptability to artificial limbs became a matter of the highest importance as the war proceeded.

Infections of moderate severity were common in the casualty clearing stations and were dealt with mostly by free incision and drainage. The most successful treatment of established infections in the casualty clearing stations was that which had always in view the certainty of a brief sojourn in these stations and the certainty of a long journey in an ambulance train. Those surgeons were most successful who limited themselves to a free opening up of the wound and the use, with or without drainage tubes, of such substances as "bipp," salt packs, flavine, and the like, together with careful attention to fixation of the fracture.

For this process of fixation, the casualty clearing stations were fairly well provided. They came into existence at a period of the war when the inadequacy of the earlier methods of splinting had been to some extent realized, and they had a free hand to choose what splints they liked, always keeping in mind the fact that apparatus must be adapted for traveling by train and car. These considerations in the case of the upper limb reduced the splint used to a fairly simple type. For the upper arm a favorite appliance was a modification of the Bortch-

gravink splint. This consists essentially of an axillary support, connected to a rigid internal splint, at the lower end of which is attached a hook by which extension can be applied. In cases where, on account of wounds, strapping can not be applied or gauze gummed to the lower half of the arm for traction, the upper part of the flexed forearm can be utilized for counterextension, flexion of the elbow joint being maintained by slinging up the forearm. Another apparatus much used was Jones's wire splint, a device on the same principles as the above but made of stout wire and including a frame for the forearm. One of the encircling wires is looped below the elbow joint and forms a *point d' appui* for counterextension. For cases where wounds in the axillary region forbade pressure, the perforated zinc sheets supplied were very useful. A shoulder case, extending down the arm, could be molded over the point of the shoulder, and with a little ingenuity could be made to include the arm. In bad cases Thomas's splint modified in size of ring and length to suit the arm, was used, especially in fractures involving the elbow joint. These gave very excellent support and some degree of extension, but they were found to be inconvienient at first as the arm could not be brought down to the side, a serious consideration in the restricted space of a hospital train. Later, however, this difficulty was met by using a swivel ring. But often it was found that a fractured humerus traveled well with a pair of simple straight wooden splints incorporated in the dressings, the elbow flexed, and the fore arm slung well up across the chest.

Fractures of the fore arm, carpus, and hand were almost invariably put up in a pair of straight parallel wooden splints of suitable width. If a gutter was considered more appropriate, it could easily be manufactured from the perforated zinc plates. There was hardly time or opportunity to pay much attention to the necessary refinements of position which become imperative at a later stage. The prevention of synostoses of the radius and ulna, of loss of spination, and of overstretching of the paralyzed extensor muscles in wounds involving the musculo-spiral nerve, were necessarily left to the base hospitals.

For the lower limb, Thomas's splint was used for fractures both above and below the knee. Many addi-

tions and modifications were added. It was found that the ring kept its place best when the hip joint was a little flexed, so the limb was slung to an iron rest which was attached to the stretcher. The splint itself was also provided with a support at right angles to the side bars. The lower part of this support kept the leg raised for 6 inches or more; the upper part provided a loop to which the foot was suspended. For extension, ordinary strapping was used at first and applied along the sides of the leg and fixed by bandages. But Sinclair introduced the fashion of attaching gauze by a specially prepared glue to the sides of the leg, with a second application of the gummed gauze to the dorsum and sole of the foot, so that traction could be made and the foot suspended also. In place of pins to fix the flannel bands which supported the limb between the bars, special clips were used which could be rapidly applied. Where the parts below the knee were involved, Sinclair introduced a special foot piece fastened to the sole of the foot by gummed strips of flannel.

It was a most ingenious contrivance and could be rapidly applied. Moreover, it was arranged so that the foot could be fixed at any required angle. He regards the great improvement in the transport splinting of tibia and fibula fractures as a marked advance. Experience has shown that whether for secondary hemorrhage or for sepsis, fractures in this region are largely represented among amputations, and both hemorrhage and sepsis are favored by the shocks and disturbances of transport. The same may be said in a lesser degree of injuries to tarsus and ankle joint. Any contrivance by which real fixation and comfort could be obtained was a great boon and saved many limbs and lives. In cases where there were wounds about the pelvis and upper part of the thigh, so that the ring of the Thomas splint could not be applied, Jones's abduction frame was used, an apparatus in which the lower half of the body was fixed in a frame with the injured limb abducted. This abduction had to be given up in the ambulance train as there was no room for it, and this part of the frame was made with a joint which allowed the two limbs to be placed parallel at will.

As regards treatment of the fracture itself, secondary esquillectomies were no more popular with British surgeons than primary. The usual procedure with frac-

tured cases at base hospitals—the first place where life-saving procedures gave way to functional considerations—was to give them a short rest before doing anyting in the way of operation. The splints were readjusted and a skiagram taken of the seat of fracture. After 48 hours clean wounds were sutured, suppurating wounds left open, and in either case the limb put up in the best possible position, a second skiagram being taken with the patient in bed. In fact the whole course of the case was followed by skiagrams and the necessary corrections made at intervals. Some surgeons kept a series of prints reduced in size in frames at the bed heads, and so were able to check progress at short intervals.

Some of the lessons learned at base hospitals regarding treatment of fractures may be briefly summarized as follows:

1. As regards the upper limb conservation must be the keynote of practice. Not only is a man's industrial efficiency much more crippled by the loss of part of his arm than of his leg, but the use of an artificial substitute is much more difficult to learn. The preservation of as much hand and arm as possible is imperative.

2. Wounds of the phalanges, carpus, and metacarpus did well on a splint which consisted of a palmar wooden splint applied to the fore arm and having at its lower end a loop of ribbon iron to which the extended fingers were fastened by tapes attached to gauze or cotton gloves gummed to the fingers. Another form of splint for the hand and carpus was Jones's "cock-up" splint, which maintained the wrist joint in dorsiflexion.

3. Loss of substance from the radius or a severe comminution of both bones about the center was apt to result in synostosis of the radius and ulna and in loss of the outer curve of the radius, leading to loss of supination. This was met by suitable positional treatment and movement.

4. The best position of the elbow joint in cases of fracture involving the elbow joint and leading to ankylosis was much debated. The factors influencing the situation are many:

(*a*) The nature of the patient's occupation is important. For heavy manual labor an elbow fixed at an angle of 120° is probably strongest and best, whereas a clerk would prefer an angle less than 90°.

(*b*) If the patient has lost the other arm, or has the other elbow ankylosed at an open angle, ankylosis at an acute angle would be best.

(*c*) Much was learned of the possibilities of secondary excision of the elbow joint. The tendency of the formation of a flail joint was great, but in certain cases a useful movable joint could be obtained and might suit certain kinds of work better than a fixed joint.

5. In a large proportion of gunshot injuries of the humerus the musculo-spiral nerve may be injured, and Sir Robert Jones pointed out that the muscles might be irretrievably damaged by overstretching if the wrist was left in its natural position of passive flexion. He devised a splint to correct this deformity.

6. In gunshot injuries to the upper end of the humerus, where ankylosis of the shoulder joint became a reasonable possibility, the arm must be put up in abduction. Many ingenious splints were devised to affect this end. Late in the war many excellent and useful arms could be seen in which the range of movement at the shoulder was surprisingly good with perhaps no more than 6 inches to 8 inches of the shaft of the humerus remaining.

As regards the lower limb:

1. An extreme observance of conservation is not so necessary here. Indeed the preservation of a damaged foot and ankle, perhaps stiff and painful, after weeks of unremitting attention on the part of the surgeon and at the expense of considerable pain, fever, and suppuration on the part of the patient, is in no sense a gain. The use of an artificial limb is much more easily learned than in the case of the upper limb.

2. In Pilcher's own observation no class of case benefited more by British war experience than comminuted fractures between the knee and ankle. In the early days of the war these fractures were nearly as formidable as those of the femur. They were always grossly infected and very often the seat of grave secondary hemorrhages. Moreover, those which consolidated often showed a high degree of deformity, or some paralytic disturbance like foot drop. With more rational methods of wound revision and sterilization, and with the more efficient fixation introduced by Sinclair, excellent results were obtained in the later days of the war. Sinclair used a Thomas splint as a supporting frame. If extension was required, as it often was, it was obtained by gluing the

rings to the skin of the thigh and then making traction on the foot piece which was gummed to the sole of the foot. The knee was firmly controlled by side pads and flannel bandages. He saw no apparatus equal to this one for efficiency and comfort.

3. Gunshot wounds of the femur were at first responsible for a very heavy mortality. It is true that the greater number died in the front line areas, but in base hospitals losses of life from secondary hemorrhages, long continued suppuration, and sometimes even from gas gangrene were very heavy. At the same time, amputations for these causes and to save life were numerous. The universal adoption of Thomas's splint effected a veritable revolution in the front line areas. It was preeminently the apparatus for transport. As a means of treatment, however, it was not found to be so satisfactory. The difficulty was extension. With the Thomas splint, pure and simple extension is obtained by counterextension against the tuber ischii. Now in many cases of young men with powerful muscles, a high degree of tension is required to reduce and keep reduced a fracture of the femur, and the pressure on the tuber ischii is not well borne. Consequently, the counterextension was dropped and a weight extension substituted, using the frame of the Thomas splint merely as a basis of support. Again it was found that plaster and gum extensions attached to the skin could not support the pull required and gave way or caused blistering. Alternatives were a stirrup inserted behind the tendo Achilles above the oscalcis, transfixion pins like those used by Steinmann, "ice tongs" or "horseshoe" clamps taking a purchase from the bone above the knee. Then it was found that on account of the length of time required to consolidate a comminuted fracture of the femur, both knee and ankle became very stiff unless exercised. A suitable modification of the Thomas splint allowed this to be done.

In conclusion Doctor Pilcher laid stress on the importance of "the unalterable canons of Listerism, which are and, since they have been enunciated, always have been the bedrock of success in surgery in the field. To carry them out is not always easy or even possible, but the measure of our success will always be the completeness with which we can provide a Listerian atmosphere to the surroundings of our wounded soldiers."

Caccia (Italy).

In connection with a concise review of the enormous material observed in the war zone and in the territorial hospitals, Dr. Filippo Caccia, Tenente Colonello Medico, Libero Docente di Traumatologia nella Regia Università di Roma, on the basis of personal experience, finds himself in a position to formulate the treatment of war wounds complicated by fractures according to the three following methods: (1) So-called abstentional method (expectant treatment); (2) complete or partial subperiosteal esquillectomy according to a special technique; (3) amputations—complete subperiosteal esquillectomy constitutes the method of choice for presumably infected compound gunshot fractures. The procedure begins with suitable débridement of the wound and exposure of the fracture focus, ablation of all contused and damaged soft parts, removal of foreign bodies and hematomas, followed by accurate hemostasis. In case the fracture focus itself presented incomplete perforations with a retained projectile, the latter was removed and the bony bed was cleansed and cauterized with the Paquelin cautery. In comminuted fractures, especially of the femur, after thorough mechanical disinfection of the soft parts with performance of débridement according to the anatomic relations of the damaged region, complete subperiosteal esquillectomy of the detached and also of the adherent bone splinters is done, provided the two main stumps of the broken bone are long enough to guard against shortening of the diaphysis, as is usually the case, thereby safeguarding the anatomic repair of the bone. Under other conditions it is advisable to leave one or more bone splinters adherent to the periosteum so as to maintain continuity between the two principal fragments.

An essential condition consists in providing sufficient access to the medullary canal for its approximate liberation from foreign material and its radical disinfection. Also all loose fragments should be removed or scraped off until healthy bone marrow is reached. Sometimes a few stitches were applied to bring the soft parts more closely together, or complete bone sutures were done in a few cases of fracture of a bone of the leg or forearm, as well as in fractures of smaller bones, always within the first 10 or 12 hours after the infliction of the wound. A favorable outcome of subperiosteal esquillectomy (prophylaxis against surgical infections) is essentially dependent upon

the correct technique and timeliness of the intervention (within the first 24, or, better, 12 hours after the infliction of the wound). The application of this method in time of war and the assurance of its success requires the establishment of special surgical units equipped with a competent staff and the means for rapid transportation. These units must, moreover, be arranged so as to have their base in the rear at a considerable distance from the fighting zone; they must be provided with about 1,000 beds and one or more surgical teams or small advanced ambulances, freely movable and ready to go to work in the fighting zone at well-selected points. Another indispensable requirement is the direction of these sanitary units by a single head, so that the properly started treatment of a given case may be carried to a successful outcome, according to the rules of the surgeon in charge.

Derache (Belgium).

The teachings of the war, from the viewpoint of the treatment of diaphysial fractures of the limbs, were discussed by P. Derache, Chef du Service de chirurgie à l'hôpital militaire de Bruxelles, who summarizes his conclusions as follows: (1) Radiographic examination before treatment, after reduction of the fracture, and during treatment is of paramount importance. (2) The immobilization of fractures must be reduced to the lowest possible minimum, and in all circumstances early mobilization is required. (3) The indications for plaster fixation apparatus are progressively becoming restricted to a few rare varieties of fracture. (4) Continuous traction is the method of choice in the treatment of the majority of fractures with displaced fragments or otherwise difficult of reduction. Continuous traction with suspension (overhead appliances) is especially recommended for fractures of the thigh. (5) Ambulant treatment of fractures of the lower extremity is the method of choice for all fractures without displacement of the fragments. (6) The indications for the open treatment of fractures are constantly extending. In certain types of fractures, osteo-synthesis is the only procedure which permits the functional restoration of the limb. It can only be performed, however, by expert surgeons, equipped with the proper tools. (7) The functional treatment of the limb must be carefully handled by the surgeon, and should be instituted from the start, in order to shorten the period of convalescence after fractures.

L. Delrez, Professeur à la Faculté de Médecine de Liége, discussed the lessons of the war, first with regard to treatment of open fractures, and second with regard to the mechanical treatment of fractures. A feat which was progressively accomplished during the war consisted in the transformation of infected fractures through secondary suture, into closed fractures, after the focus had been surgically sterilized. A decisive advance was brought about by timely trimming of the wounds, thereby permitting surgical asepsis at the time of the first operation and immediate suture. Reduction and fixation of all fractures involve a problem of muscular physiology; the correction of deviations and displacements is greatly simplified by the physiological resting position of the muscles having their insertions on the separated bone fragments. Accordingly, the best position for fractures of the femur is flexion of the thigh on the pelvis, with flexion of the leg on the thigh. The physiological resting position of the muscles, suspension of the limb, and traction applied to the peripheral fragment furnish a maximum guaranty of good reduction. Delrez (Belgium).

What the war has taught in the physiotherapy of the sequelæ of fractures of the limbs is epitomized in the instructive contribution of Doctor De Marneffe, médecin principal, who discussed medical gymnastics of the muscles, with the use of apparatus: mechanotherapy, active in the form of medical gymnastics with suitable apparatus, or passive, through pneumatic mobilization. The Bier method of passive hyperemia is a physiotherapeutic procedure, and may be divided into (*a*) general hyperemia, by means of the Esmarch bandage; and (*b*) local hyperemia, in the form of cupping. Thermotherapy means the application of heat in any form by suitable vehicle (air, water, steam, sand, etc.). Physiotherapeutic measures in a general way are to be directed against the cause; when the cause is obscure the treatment becomes symptomatic. De Marneffe (Belgium).

Physiotherapy surpasses chemical therapy in the possession of an abundant store of remedies and modalities, including some specific agents against the various sequelæ of fractures of the limbs. It would be well for all surgeons to follow the example of certain masters of war surgery who emphasized from the beginning of the campaign that the anatomic result in these cases is unimportant as compared

to the functional result. In order to accomplish the best possible functional result, they learned to appreciate the necessity of teamwork and close cooperation with both physiotherapeutists and orthopedists. It is only by means of this practical, reasonable, and rapid method that the wounded, immediately after the infliction of the injury and directly after the performance of the operation, are enabled to take advantage of all the scientific appliances at the disposal of current physiotherapy and modern prostheses, the efficiency of which is very great provided they are applied at an early date.

Reynders (Belgium).

The importance of appropriate facilities for transportation of the wounded, more particularly of soldiers with fractured long bones, was emphasized by Doctor Reynders, Mèdecin de Bataillon de 1re classe Hôpital Militairè de Liége, who presented the subject in his contribution to the lessons of the war in the treatment of fractures of the limbs. Men whose fractured limbs have been properly handled in transit reach the hospital in better condition for surgical interference, from the local as well as from the general viewpoint. This desirable safe transportation is provided by the Thomas splint, which should therefore form part of the equipment of all the emergency services. Open fracture foci constitute compound wounds, in which it is imperative to keep in mind the existing tendency to contamination and the necessity for creating a sufficient resistance against infection by means of thorough wound asepsis. This is accomplished through the timely removal of all tissue or wound constituents exposed to infection within eight hours after the infliction of the injury. Concerning the soft parts, the cellular and muscular tissue must be sacrificed until healthy tissue is reached, and this should be unhesitatingly done, as war experience has taught the remarkable extent of muscular repair. The skin, on the other hand, should not be extensively removed without necessity, for it is fatally damaged only in the close vicinity of the traumatism, and the fact must never be lost sight of that the skin is the be t protection for the wound and plays an important part in the process of cicatrization. As to the bone itself, although all dead or devitalized material must necessarily be removed, it is especially important to remember the desired consolidation, to realize the value of a bone splinter in regard to the life of the bone.

to preserve it as a possible graft by virtue of its living periosteal and muscular pedicles.

A fracture focus which has had its vitality restored and been equipped for its fight for survival can be transformed into a closed fracture focus by means of primary suture. In case there is any doubt as to adequate asepsis, or the efficiency of local and general resistance, the wound phenomena and general manifestations on the part of the organism should be watched, and the following procedures be adopted according to their behavior: (1) Application of delayed primary suture; (2) expectant measures until sterilization has been obtained, under control by the microbian curve, followed by application of secondary suture; (3) establishment of the Carrel method of treatment in infected cases.

Prior to the war, the three available methods of dressing fractured bones consisted of: (1) Immobilization of the fragments, after reduction, in a rigid cuff or trough, usually of plaster of Paris; (2) traction of the limb, for the purpose of obtaining end-to-end approximation of the fragments, through continuous extension; (3) direct surgical intervention on the fragments, with repair of the bone, in the form of osteosynthesis. The war has brought no new methods, but the customary procedures were tried and accepted, rejected, or improved upon. Plaster has had its day, and its use has been practically abolished by the war. It gives a false security from the viewpoint of anatomic repair; the limb is immobilized, and its entire function remains to be restored after consolidation has taken place. Delbet's plaster apparatus is a walking appliance, based upon mobilization of the limb.

Continuous extension is applicable in the majority of cases, with favorable results. It permits inspection of the limb, its management, and early mobilization in bed. In order to make extension efficient, the affected segment of the limb must be at its maximum of muscular relaxation. A more nearly perfect extension is obtained by means of Steinmann's pins and Willems's screws, which act upon the bone itself.

Osteosynthesis is indicated only in suitable cases, and its performance should be restricted to (1) cases in which extension can not yield results or has failed to accomplish the desired end; (2) cases in which a perfect anatomic repair is absolutely essential from the functional viewpoint; (3) open fractures, where osteosynthesis con-

stitutes merely a supplementary operative procedure, provided that its performance does not dangerously prolong the intervention, and that the intervention on the soft parts leaves no doubt, from the viewpoint of an aseptic condition of the parts.

The diagnosis of a fracture is clinched by radiography. While a diagnosis of fracture can be based upon the findings on clinical examination, radiography alone can confirm this diagnosis by furnishing the picture of the fractured bone, showing the shape and arrangement of the fragments, their mutual relation, their exact position toward the axis of the bone, and their general situation. In certain circumstances, stereoscopic radiography may be required for more accurate information, anterior and lateral radiography simply showing the presence of anterior, posterior, or lateral displacements. The selection of the proper method of dealing with a given fracture is based upon the radiographical findings, and radiography also serves as an indispensable control for the efficiency of the treatment in the course and continued care of fractures of the limbs.

Hendrix and Petit (Belgium).

The contribution of M. Hendrix, Médecin de B^{on} de 1re classe, Chef du Service de Prothèse du SS. de l'Armée Belge H. M. de Woluwé-St.-Pierre, Bruxelles, and M. Petit, Médecin de B^{on} de 1re classe, Chef du Service de la Restauration Fonctionelle par le Travail H. M. de Woluwé-St.-Pierre, Bruxelles, to the subject of war-taught lessons in the treatment of fractures of the limbs is strictly limited to the *prosthetic aspect* of this problem, irrespective of the surgical or orthopedic treatment of fractures. The authors point out the part of the prosthetist in modern fracture mechanics and his intermediate position between the surgeon and the physiotherapeutist. Their object is to call attention to the employment of temporary appliances before the institution of permanent apparatus. The part of the prosthetist is emphasized in its importance for the reeducation of the motor powers of war cripples who have been fitted either with temporary therapeutic appliances or with permanent apparatus for existing incurable deformities. In connection with the different types of appliances devised for the various complications of fractures, the announcement was made of a demonstration to be held during the congress at the military hospital of Woluwé-St.-Pierre, near Brussels, in

the prosthesis workshops of the Belgian Army medical service, promising the demonstration of an original method devised by the authors for measuring deformities of the lower limbs with the object of correcting the faulty statics by means of special boots, manufactured according to a procedure based upon a mathematical calculation of the existing deformity.

Picqué and Rouvillois (France).

The primary and secondary treatment of diaphysial fractures, on the basis of experience during the World War, is discussed in the address of Doctor Picqué, Médecin principal de 2e classe, Professeur agreégé d'anatomie à la Faculté de Médecine de Bordeaux, and Doctor Rouvillois, Médecin principal de 1re classe, Professeur de chirurgie de guerre à l'Ecole d'application du Val-de-Grâce. Their analysis of the various techniques evolved in the course of the war culminates in the following suggestions for the rendering of more definite indications. There is no diversity of opinion as regards the treatment of infected fractures at the start. In the secondary period, extensive esquillectomy is required as a minimum operation, unless excision is rendered imperative by sepsis or gas gangrene. However, following drainage of the site of fracture, the customary fixation or immobilization by means of fracture apparatus has been improved upon in certain cases by the performance of secondary osteosynthesis, a noteworthy innovation opposed to the former notion of danger from foreign bodies in infected wounds. On the other hand, there are emergency cases in the primary stage which hardly call for discussion, such as shattered bones with or without complicating vascular or nervous lesions, or already in a stage of incipient infection. All are agreed in these circumstances as to the necessity of saving life through the sacrifice of the limb, by means of amputation, with flaps, where practicable, or a straight circular incision when quick work is required on account of shock. Small punctiform perforations by rifle bullets permit expectant measures, unless threatened by the onset of infection. The bones may also be shattered by glancing or short-range bullets, which have an excessive penetrating power and sweep all free or adherent splinters together with the periosteum out of the fracture focus, which presents only an enormous loss of substance between the fracture ends. The soft tissues are damaged throughout by projecting

splinters and fragments of projectiles and are seriously threatened by infection, so that simple cleansing is the most imperative intervention.

Subsequent pseudarthrosis in these cases is due to the traumatic resection of the diaphysis and separation of the parts through the projectile; but a considerably improved functional prognosis is sometimes obtainable by means of primary bony osteosynthesis or bone grafting to one or two bones, according to the character of the limb segment. Whereas operating surgeons are fairly well agreed concerning the cases referred to above, conditions seem to differ as regards the very common cases of diaphysial fractures through shell splinter with medium sized openings. There are two distinct and apparently opposite methods: (1) Moderate, sometimes very reduced, esquillectomy, with employment of chemical disinfection according to the Carrel method, in preparation for secondary suture. (2) Extensive esquillectomy, with or without osteosynthesis, followed by primary suture. The opposition is apparent rather than real and is greatly lessened in actual practice. With special reference to esquillectomy, the gap between the adherents of extensive and moderate procedure is bridged over by the universal concession that the aim and object must be the purification of the medullary focus under the best possible preservation of the diaphysial continuity. Concerning primary or secondary suture, with or without osteosynthesis, although both methods have yielded good results in stationary formations and at the hands of skilled surgeons, it is certain that at the time of widespread offensive movements, with large numbers of wounded and delayed surgical interventions, it is advisable to restrict the performance of suture. But the World War has raised the standard of a new ideal of fracture treatment. In certain offensive movements in Flanders, as the result of excellent organization and coordination from the medical as well as tactical viewpoint, the treatment of fractures could be carried out in field hospitals as in the stationary formations in the rear. Picqué emphasizes, in concluding, that in the midst of admirable development of the technique, such observations confirm the axiom that organization everywhere takes precedence over technical factors.

In discussing the teachings of the war in regard to apparatus for diaphysial fractures, Rouvillois points out

that from a rudimentary state in 1914 fracture appliances in general have undergone a series of improvements during the war concerning: (1) The appliances themselves, through the adoption of numerous models, which, however, are for the most part merely old, renewed, or transformed models. Irrespective of their configuration, they all belong to one of the four following classes: Simple fixation apparatus, continuous extension apparatus, suspension apparatus, walking apparatus. (2) Organization of special services, intercoordinated from the technical viewpoint, in the army zone and in the zone of the interior. These advances must be considered as representing modern acquisitions not only for the transitory time of warfare but also in a permanent way in civil practice. As to lessons for war time, it was found that appliances for *transportation* must be reduced to a few elementary types; they must be simple, strong, interchangeable, and easily adjusted by trained attendants without special education in this line. These appliances must also be light, of small volume, and as a rule should permit continuous extension. Apparatus for *treatment* must, on the contrary, be of highly variegated configuration and involve the application of many principles in the choice of which the surgeon should be left the greatest option. The most commonly required apparatus are walking appliances and those for continuous extension, with or without suspension.

The management of broken bones by fracture apparatus is closely related to the question of supreme organization, as dominating the general problem of fracture treatment. The plan adopted during the war has been sufficiently tested to justify its permanent retention.

With special reference to war-taught lessons for *civil practice*, the obsolete pre-war appliances should now be abandoned and replaced by those which have proved satisfactory in the armies, especially walking appliances and appliances for continuous extension, combined with or without suspension. Provided their employment is consistent with the existing lesions, the walking appliances permit the early restoration of the functions of the limb, while extension apparatus permits traction in every required direction, radiographic control at the bedside, frequent and easy change of dressings, insuring a maximum of comfort to the patient. Concerning organization in time of peace, the establishment of at least one service

analogous to the fracture centers in the armies is to be desired in large cities and important industrial centers where accidents of all kinds are extremely common. This specialized service should be equipped with the necessary appliances, in order to give the patient in times of peace the benefit of the progress which has been accomplished during the World War.

de Santamaria (France).

By means of his tried and tested special apparatus, Dr. A. S. de Santamaria, of Paris, states that the functional capacities of the upper or lower limbs, after fractures, can be easily and reliably preserved without open operations. Reliable fixation is a purely mechanical question, the maintenance of reductions or corrections depending upon the strict stability of the procedure which is utilized for the purpose. The Santamaria fixation apparatus has been in use for over six years, "without accidents or failures," in a great variety of difficult cases, and is brought to the attention of the congress on the basis of extensive experience. A series of radiograms of articular, juxtarticular, and diaphysial fractures which had been successfully treated by means of this apparatus were exhibited at the meeting. The results show that the unreliability of fixation can be avoided, so that loss of function from this cause is not excusable. According to the findings, this apparatus provides an absolutely reliable fixation, even in the most difficult cases, while permitting early mobilization, from the first days of the treatment, no matter which limb is fractured, and irrespective of the kind or site of the fracture. It appears that without risk of any kind, and with reasonable certainty of success, the patient may be promised a minimum of functional disablement, or even the complete preservation of all functions, in favorable cases. The speaker emphasized the essentially practical aspect of this surgical question, and its vital interest for the patient, the State, or the insurance companies which bear the indemnity costs, as well as for the physician, upon whom rests the responsibility for the final outcome.

Kensa Oyama (Japan).

Surg. Lieut. Col. Kensa Oyama, of Japan, spoke of the recent management of fractures as one of the lessons given by the war. Although disposing of but a small number of important fractures, incurred in the battles of Tsingtau and Siberia, he is ready to emphasize the efficiency as well as frequent necessity of reducing and

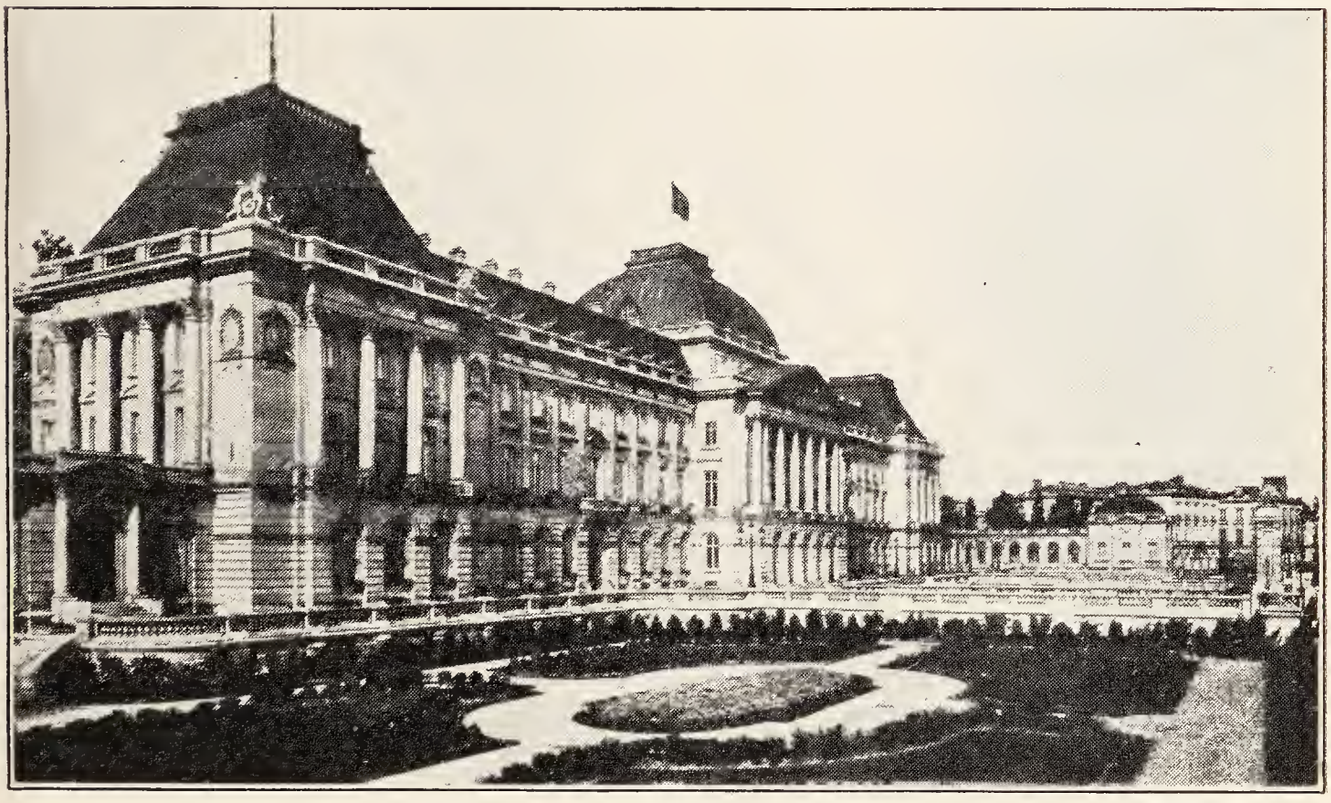
COMMANDANT VONCKEN, SECRETARY OF THE CONGRESS. CHIEF SURGEON OF THE SERAING INDUSTRIAL HOSPITAL AND SURGEON TO THE MILITARY HOSPITAL AT LIEGE.

986–1

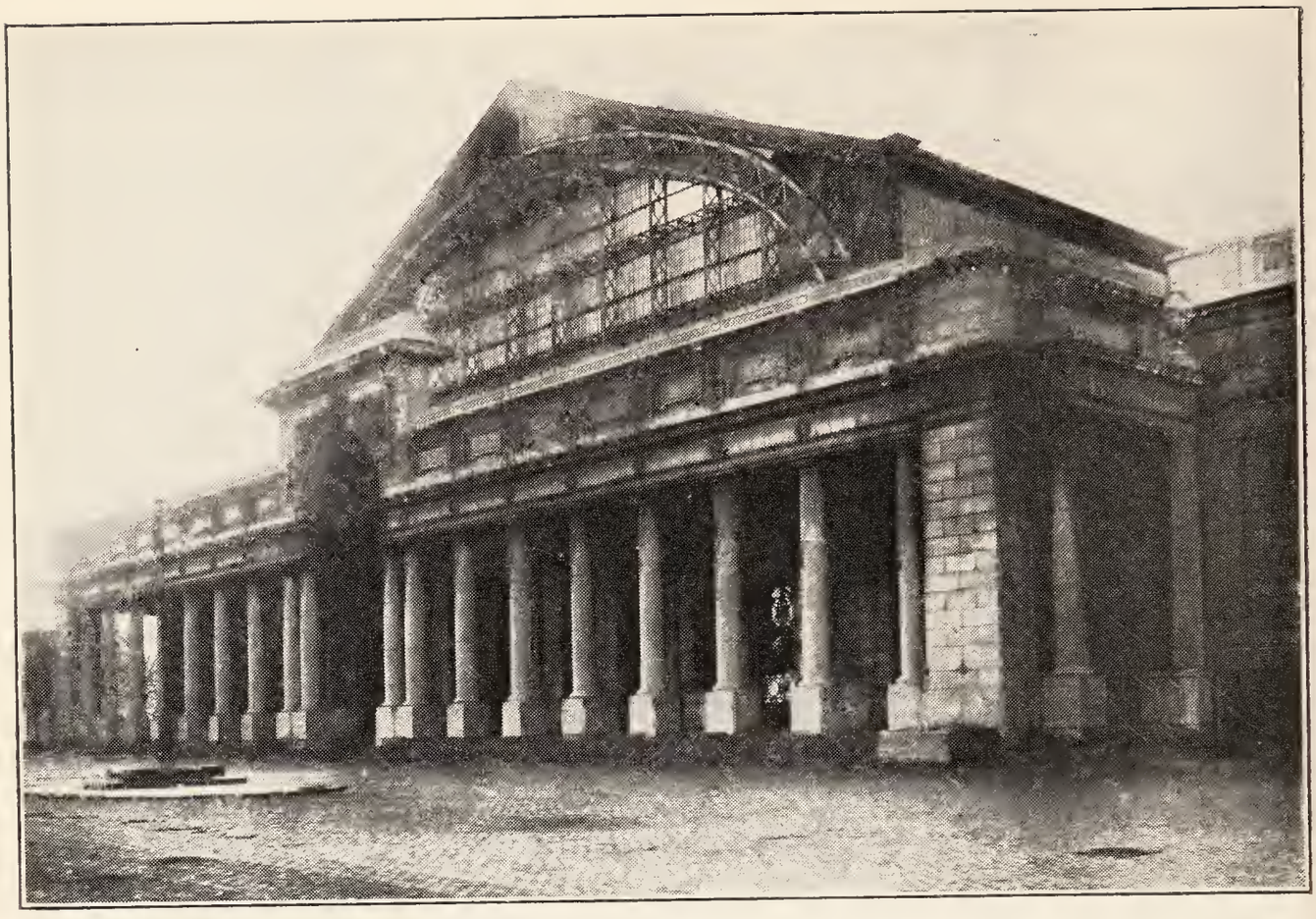
LOUVAIN. THE MILITARY HOSPITAL—ONE OF THE FEW BUILDINGS IN THE CITY WHICH THE GERMANS DID NOT DESTROY.

986–2

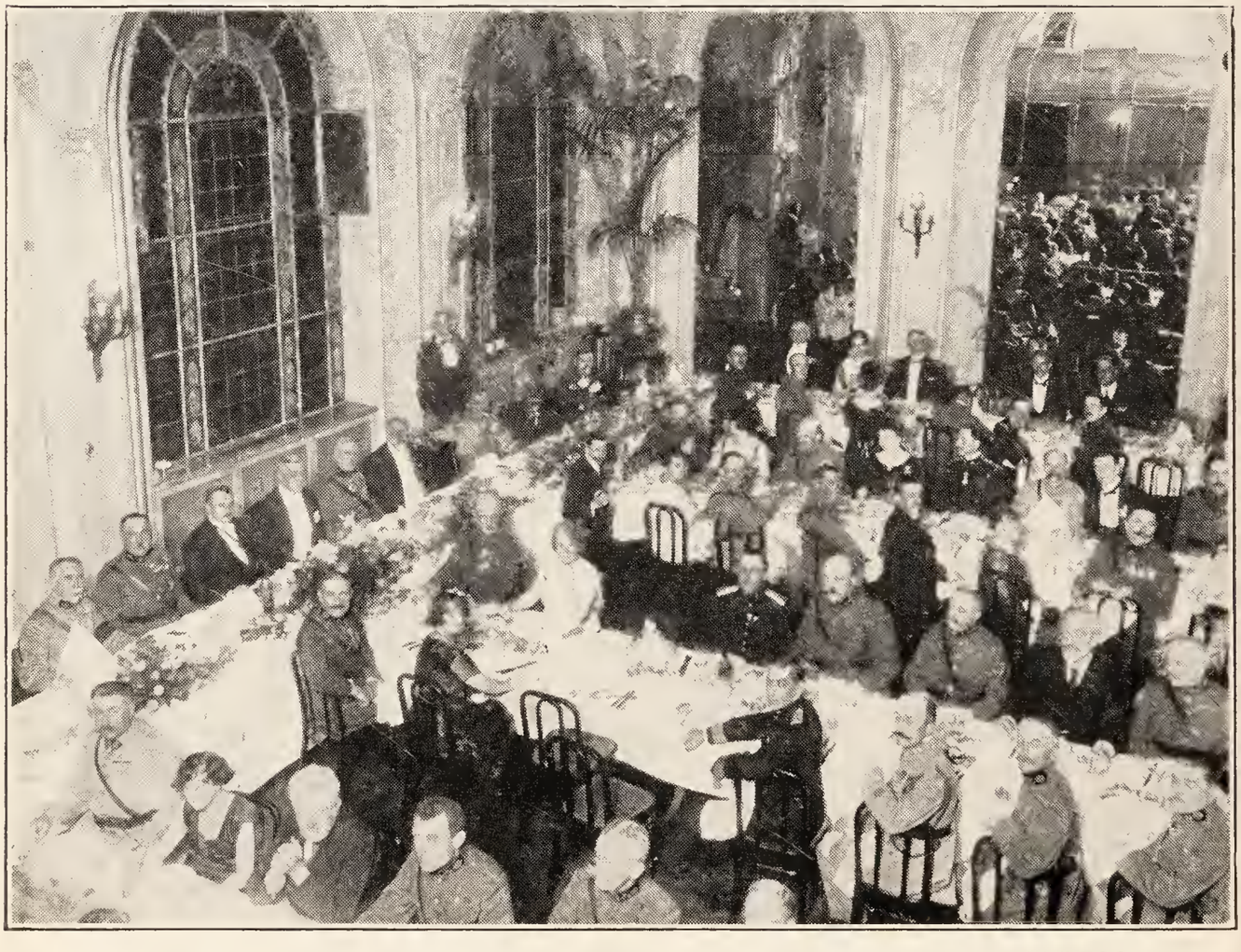
BRUSSELS. ENTRANCE TO THE PALAIS DU CINQUANTENAIRE.



THE ROYAL PALACE AT BRUSSELS.



BRUSSELS. PALAIS MONDIAL, WHERE THE CONGRESS MET.



BRUSSELS DINNER GIVEN TO THE DELEGATES TO THE CONGRESS.

correcting the bone fragments with the patient in bed, utilizing a portable X-ray apparatus. He is furthermore convinced that a good restoration of physical function is best obtained by means of prompt employment of massage and institution of gymnastic exercises, fully indorsing the modern principles of early mobilization after fracture.

Bainbridge (United States of America).

Under the title of "Some Factors in Bone-Repair,"[3] Commander William Seaman Bainbridge, Medical Corps, United States Naval Reserve Force, the American delegate to the congress, enumerated and discussed a great variety of conditions which influence the healing of a fractured limb. After passing in review the current methods of modern fracture treatment, and emphasizing that there is no method of fixation at our disposal which directly favors or hastens bone union and repair of fractures, the speaker pointed out the necessity, based on recent discoveries, of looking for improved results of fracture treatment in some new directions. Surgeons must keep in mind certain conditions under which there is more or less interference with bony growth. Modern experience teaches that infectious processes are to be reckoned with in numerous obscure conditions, and delayed bony union after fractures, for which no satisfactory explanation can be found, often is one of these conditions. Endogenous infectious processes in the bone marrow may lead to congestion and disintegration.

The fact must not be overlooked that lesions of infectious origin, both from without and within, are of frequent occurrence in bone. External infections may extend inward through the cortex of the bone, an internal infection traveling by the opposite route. The tendency of bone infection is to extend widely beneath the periosteum or through the marrow spaces, causing more or less extensive necrosis. Aside from the staphylococcus aureus, which is the most common pathogenic agent in bone infection of endogenous origin, other germs may be responsible, such as the streptococcus pyogenes, the pneumococcus, the gonococcus, or the typhoid bacillus. In certain cases of acute inflammatory atrophy of bone following upon secondary infection of adjacent joints, the presence of the gonococcus has been demonstrated.

[3] At the request of the head of the British delegation, this contribution was published in full in the Journal of the Royal Army Medical Corps.

As regards focal infection and its rôle as a factor in the repair of bone, it is suggestive that according to recent investigations of Pemberton (1920), on the nature of arthritis and rheumatoid conditions, the Army furnished 400 cases of chronic arthritis, 298 of which showed demonstrable surgical foci, mostly in the tonsils (208), the remainder in the teeth or in the genito-urinary tract. Removal of the focus of infection and correction of the altered metabolism by regulation of the diet were found to have a beneficial effect on these disturbances.

Constitutional diseases, such as tuberculosis and syphilis, are undoubtedly responsible for delayed union in a certain number of cases. It is noteworthy in this connection that syphilis, according to recent investigations, appears to have such a pronounced structural effect upon metabolism of bone tissues as to often leave more convincing proof of an old luetic infection on the X-ray plate than is afforded by the Wassermann or Noguchi tests.

The gastrointestinal tract, with its many side pouches, recesses, culdesacs, and extensions, such as the gall bladder and appendix, represents an important center of dangerous foci of infection, and incidentally for delayed bone repair after fractures. Other important and dangerous strongholds of infection are represented by the mouth cavity, the tonsils, and the nasal accessory sinuses.

At the time of the speaker's visit in the fall of 1915 to the British front, his attention was called to many interesting facts. He was informed, for example, that early in the war, during the transportation of the native troops from India, the medical staff was scrupulously careful in the observance of all dietetic religious regulations, special food and cooks being provided for the men. The failure of fractured bones, as well as soft parts, to heal as promptly as should have been the case, led to a careful investigation of existing conditions, with the result that the men's teeth were found to be very defective and in a state of rapid decay, while the mouth cavity was fetid and the gums were the seat of pyorrhea alveolaris. The cause of these lesions was ultimately traced to the fact that the men, who at home cleaned their teeth with olive sticks had refused to use the toothbrushes furnished, for fear of contamination with pig's bristles, which are un-

clean according to their religious teachings. A comparison of these early troops with those who arrived later in the war, after this omission had been corrected and the buccodental hygiene improved, showed not only that the men's teeth now remained free from decay but that fractured bones and wounds of soft parts healed more rapidly. This fact was called to the speaker's attention by several medical officers.

The callus for the repair of the fractured bone is expected in a measure to form from the hematoma. Fractures do not consist merely of a broken and more or less displaced bone but, as we know, all bony injuries are associated with a bloody extravasate which in closed fractures may remain subperiosteal or pass into the surrounding tissue or in open fractures escape to the outside. The loss of the extravasated blood has an undesirable influence upon the repair process in so far as its presence undoubtedly favors the formation of the callus. On the other hand, aside from the danger of infection from without or within the hematoma may exert an injurious pressure upon the neighboring organs, causing congestion and lymph stasis, which are further increased by muscular inactivity. This retardation of the blood and lymph current involves a more or less imperfect nutrition of the surrounding tissues and at the same time exposes them to the danger of autoinfection. The causative relation between the hematoma and the appearance of the callus is shown by certain cases of clean open fractures in which the blood has escaped to the outside, with the result that a very weak callus is formed. On the other hand, it is a familiar fact that a sluggish callus formation can be hastened by the injection of blood at the site of the fracture or through artificial production of a hematoma by rubbing the bone ends against each other.

The young callus at first has the character of granulation tissue, but later on gradually increases in solidity through deposit of lime salts. Its mechanical properties are of great importance from the therapeutic viewpoint. Newly developed callus is semielastic and yielding, so that it becomes readily deformed under the influence of relatively slight forces, resuming its original shape after these forces have ceased to act. But the semielastic callus is unable to overcome a marked deformity, which is apt to become permanent, the callus weakening and giving way under its influence. The frequent repetition of

injurious factors, including irritation by endogenous pathogenic microbes and their toxins, acting upon the young callus, frequently results in a pseudarthrosis, which means that no bony, but merely a fibrous, union has occurred. Provided all mechanical rules have been observed, pseudarthrosis is probably referable to latent microbism in the majority of the cases. The solidity of the exuberant callus, which is sometimes formed as a result of latent infection, is due to its great bulk which counteracts its softness. When this mass later on undergoes a transformation into bone substance, it acquires a much greater solidity than necessary. Before these superfluous bony masses can be reabsorbed through the osteoclasts, they may exert an injurious action through pressure upon adjacent structures, impairment of articular movements, or formation of ankylosis. In other cases the abnormal callus interferes with adjacent organs, especially nerves, resulting in atrophic changes. Exuberant callus will also develop when the two bone ends are more or less displaced or imperfectly adjusted. After consolidation has taken place in these cases, the large callus serves to strengthen the bone, which always needs added support when its longitudinal axis is displaced.

The softness of the young callus requires fixation of the injured limb, at least to the degree that the slight restricted excursion does not exceed the elasticity of the callus. The rest, however, which is needed for the reunion of the broken bone retards the blood and lymph flow, while condemning the muscles to inactivity and exposing them to the danger of atrophy of disuse. As soon as possible during fixation, functional treatment (introduced by Lucas-Championniére) should be instituted in the form of exercises of the muscles, tendons, and joints, so that their recovery may proceed along with the repair of the fractured bone. A very common cause of badly healed fractures of the long bones consists in stiffening of the adjacent joints, usually associated with incomplete correction of the displacement of the broken bone ends.

Aside from auto-infection with buccopharyngeal and other microbes, there is reason to believe that a deficient or faulty action of internally secreting glands may be in part responsible for delayed union or nonunion in fractures of the long bones. The endocrinic glands undoubtedly exert some influence upon the bone system under physiological as well as pathological conditions. The

growth of bone is known to be injuriously affected by the diminished or exaggerated function of certain ductless glands, notably the thymus, the thyroid, the parathyroids, and the suprarenals.

The question arises if the administration of carefully selected endocrinic extracts, known to exert a stimulating effect upon bone growth and ossification, might not be advantageously introduced as a routine feature into the treatment of fractures of the long bones. In all probability the normal function and cooperation of several internally secreting glands is essential to the utilization of the calcium and phosphorus contained in the food in the metabolism of the bones. At the present limited stage of our knowledge the subject may be tentatively approached from two viewpoints, referring the disturbances in the repair process either to general malnutrition, with involvement of the endocrine glands, or possibly to the absence of the indispensable vitamines, damaging the function of these ductless organs.

Vitamins are nitrogenous crystalline bodies of very complicated structure existing in fresh animal and vegetable foods. Aside from general nutritional disturbances due to the absence of vitamins from the diet, peculiar systemic disturbances of the bony framework of the body have recently been described in Germany and in Austria, where they assumed an endemic character. Much attention has of late been devoted to diseases due to restriction of fresh animal and vegetable foods, with absence of vitamins from the diet, and these conditions are sometimes grouped together under the heading of "avitaminoses," comprising scurvy, beriberi, pellagra, infantile scurvy, rickets, and osteomalacia. The vitamins, aside from their absence in unsuitable foods, may be destroyed by mechanical or chemical processes, or through the action of excessive heat. In experiments upon young guinea pigs and other animals, not only scurvylike conditions but actual changes of the bones have been produced through exclusive feeding with highly sterilized cow's milk. Dietetic errors in the form of a deficiency of calcium in the food are naturally capable of inducing an impoverishment of the bone in lime. Disturbances in the phosphorus metabolism also enter into consideration, for it has been shown experimentally that the bones may become decalcified through continued administration of food poor in phosphorus, leading to osteoporotic changes,

proliferative processes in the periosteum and cartilages, thickening of the epiphysis, and curvature of the bones.

Empirical proof of the favorable influence of fat soluble vitamins on the growing and mature osseous system has long been furnished through the beneficial effect of cod-liver oil on rachitic children, this substance being extremely rich in these vital supplementary food constituents. Comb honey has also been shown to contain a moderate amount of fat soluble vitamin, but this is entirely lost in the commercial strained product. Denatured and so-called predigested foods, if not positively injurious, undoubtedly deprive the body of important building material and are probably in part responsible for incomplete reconstructive processes of various kinds. The harmful action of defective foods on the teeth, and their part in the production of caries, has often been discussed in the dental and orthodontic literature. Through an unsuitable diet consisting entirely of soft starchy foods distrbances in the form of ostoporosis have been experimentally produced in the growing bones of young dogs; the absorption of the bone substance increased and the formation of new bone diminished as compared to the controls.

The same factors which are concerned in the nontraumatic diseases of the bones and joints are likewise operative in bone repair after fractures. Blood chemistry no less than blood bacteriology enters into consideration in the complicated repair process of fractured bones, and the significance of chemical factors must not be lost sight of in this connection, for the normal course of bone repair is often arrested by chemical change without bacterial invasion. All fractures are accompanied by a lowered local vitality, due in part to a changed blood supply and diminished nutrition.

Absence of the normal bone salts is demonstrable in many cases, and this departure from the normal standard is visible to the experienced eye in X-ray plates of the affected bones. The speaker's own experience includes cases in which no callus had formed, although the mechanotherapy could not be improved upon. Without any other modification of the treatment, these patients were given calcium salts for a variable length of time, according to the requirements, with the result that callus formation and union were promptly obtained.

Although opinions are still at variance concerning the bearing of focal infections on bones and joints, the existence of latent microbism and auto-infection is generally conceded, so that this principle must now be applied to the course of repair processes in the body in general and in fractures of the long bones in particular.

The modifications of the regional blood supply incident to a break in the continuity of a given bone naturally play an important part in the repair of the lesion. Injury of the nutrient artery of the broken bone is often an inevitable concomitant of all fractures. A number of delicate new blood vessels are formed in nature's effort at compensation for the maintenance of a sufficient blood supply. When the extension of the contracted parts is not very carefully timed and manipulated, the stretching of all the regional blood vessels results necessarily in diminution of their caliber and nutritional impairment of the area supplied by them. A highly injurious influence may thus be exerted upon the constructive metabolism of the bone. In order to obtain the best results in the treatment of fractures, practical application must be made of the war-taught lesson that the *normal* circulation, nutrition, and mobility of the injured limb must be maintained as far as possible, thereby insuring the vitality of the parts and favoring the formation and solidification of the callus, while guarding against the wasting of muscles and the stiffening of joints.

The many concealed factors at work in the complex process of bone repair which are entitled to serious study in behalf of the improved results of fracture treatment are only beginning to be understood and appreciated, so that a promising field is thrown open for further investigation along these lines. The points touched upon in this review may be briefly summarized as follows:

Factors influencing bone repair after fractures:

I. Blood bacteriology:

(*a*) Lowered resistance of fractured bone, favoring auto-infection and deposit of infectious agents from the blood (latent microbism).

(*b*) Metastatic infection of fractured bone, from concealed foci in the tonsils, teeth, gastro-intestinal or genito-urinary tract.

(*c*) Constitutional disease, such as syphilis, affecting the structural metabolism of bone tissue.

II. Blood chemistry:

(*a*) Action of internally secreting glands.

(*b*) Metabolic dyscrasias.

(*c*) Effect of vitamines, changes in phosphorus and calcium metabolism.

III. Interference with the constructive metabolism of bone through injury to the nutrient artery and changes in the caliber of the regional blood vessels.

Chambers (Britain).

The mechanical treatment of war fractures formed the subject of a contribution by Surg. Rear Admiral J. Chambers, C. M. G., of the British Navy, who pointed out that all methods aim at the prevention of shortening and at the maintenance of the fractured limb in proper alignment, while permitting ready access to the wound. He reviewed the methods of splinting which, in his experience, proved most useful and from which, in his opinion, the best results were obtained. These accounts cover fractures of the lower limb, including injuries of the knee, fractures of the tibia and fibula and through the ankle joint; fractures of the upper limb, including the shaft of the humerus, injuries of the elbow, and fractures of the forearm. Successful management of all these war fractures necessarily requires much mechanical skill and admits of the utilization of a great variety of procedures.

In fractures through the hip joint, and those just below the trochanter, the modified Thomas splint, which Sir Robert Jones describes as an "abduction frame," is recommended. In this method extension is secured by strapping on the injured limb, with counterextension by means of a groin strap on the opposite side of the pelvis. The abduction frame secures fixed extension in abduction.

In other fractures of the femur the Thomas splint gives the best result. In the use of the Thomas splint, reduction is accomplished by a constant pull, and counterextension is gained by elevating the foot of the bed and employing the weight of the patient, there being two fixed points, viz, the tuber ischii and the distal end of the splint. There is thus a fixed long axis pull, with the limb in the position of extension. The ring of the splint ought to fit closely, pressing in the tuber ischii.

In fractures of the lower third of the femur, the leg is put up in flexion, the Thomas splint being bent at the knee.

The extension is applied either by adhesive strapping or by the glue method of Sinclair. The speaker

found the glue method very satisfactory, and the suspension frames recommended by Sinclair were employed in his wards with much success and with added comfort to the patient.

The Hodgson splint was also employed, more especially in fractures of the upper third of the femur. The speaker is, however, personally of the opinion that all fractures of the femur are best treated by the Thomas splint, with the addition that the splint should be completed with flannel slings supporting the posterior surface of the limb.

In injuries of the knee, the Thomas splint is again employed; hyperextension at the knee is to be avoided, a position of slight flexion (not more than 5°) being preferred.

The skeleton foot splint, as used by Sir Robert Jones, is most useful in fractures of the tibia and fibula and through the ankle joint. When both bones are broken and there is overriding of the fragments, extension must be employed. This can be easily done when the fracture is situated in the upper half, by means of the Thomas splint, but when the fracture is near or into the ankle joint, and a wound is present, extension becomes more difficult. This difficulty can, however, be overcome by a fenestrated plaster dressing reinforced by an iron band, forming a loop from which extension can be made, a method advocated by Mayer. The speaker thinks that this method of extension is preferable to the transfixion of bone method recommended by some surgeons.

In severe cases of fracture through the shoulder joint and surgical neck of the femur, with suppuration, and where ankylosis may be expected, the arm is to be kept in the abducted position (50°), and excision is best performed. The abduction splint of Sir Robert Jones is very useful and very satisfactory in these cases.

The modified Thomas humerus extension splint was found to be the best method of dealing with fractures of the shaft of the humerus, and a modified Thomas knee splint maintaining the limb extended in the abduction position can be employed. Both of these splints were extremely useful in war fractures of the humerus, as they permit of easy dressing of the wound.

In injuries of the elbow the question of excision arises. When ankylosis is aimed at, position is one of most im-

portance, the proper position being flexion (about 70°) and supination.

It is very important in fractures of the forearm to maintain a position of supination. In gunshot fractures of the wrist it is also of extreme importance to maintain the hand in hyperextension, which is easily done by means of Sir Robert Jones's hyperextension hand splint.

Timbrell Fisher (Britain).

While on duty with British casualty clearing stations, A. G. Timbrell Fisher, of London, the contributor of a brief but comprehensive paper on "Gunshot Wounds of Joints," had occasion to treat a large number of such cases. He gives a brief historical résumé of the treatment of gunshot wounds of joints in previous wars, from the Battle of Waterloo to the World War. Here shell wounds formed a large majority of the total of injuries, while the bullet wounds were produced by the modern conical bullet traveling at short range at the height of its velocity. With special reference to operative treatment, joint injuries are divided as follows: (*a*) Wounds of synovial membrane not involving articular ends of bones; (*b*) wounds involving the articular ends of the bones and gunshot wounds of joints with much comminution of articular surfaces; (*c*) gunshot wounds of joints complicated by serious damage to adjacent muscular or tendinous structures, blood vessels, or nerves.

Concerning the repair of breaches in the surface of the articular cartilage, Timbrell Fisher and Shattock have observed that, provided intra-articular adhesions are prevented by early movement, the repair of such a breach takes place by true cartilaginous repair; i. e., there is a formation of new cartilage from the articular cartilage on either side of the breach. It is the author's conviction that many of the stiff joints following gunshot wounds are due to ignorance and neglect of underlying pathological principles. Experiments on animals have shown that, provided movement is instituted early, healing takes place in the form of a smooth surface largely composed of newly formed articular cartilage. The after treatment of cases with slight or moderate comminution of articular surfaces rests, therefore, on the principle of gentle joint movement after the wound has healed—active movements being better than passive. Properly performed joint movements prevent the formation of intra-articular adhesions and hasten the development of a smooth healed surface of articular cartilage.

Goormaghtigh (Belgium).

In a contribution entitled "The method of immediate active mobilization in fractures with shattering of the knee." Dr. N. Goormaghtigh discussed the limits of application and the results of Willems's method in the treatment of extensive knee fractures. Following the performance of reduction, arthrotomy and surgical purification of the fracture focus, screws are inserted into the malleoli and the limb is forcibly extended, the fragments being held in place through the continuous extension. Muscular action is now possible, and active movements may begin while continuous extension is in use; from being necessarily limited at first, these movements are made progessively more extensive. In case the relative relations of the fragments are changed in the course of excursion of the limb, the return to the resting position will remove the disturbance. Patients are instructed to move the wounded joint as soon as the first day, beginning with very slight active movements which are gradually extended. The traction is stopped as soon as possible, as during its employment extension movement is merely passive, because of the weight. In a general way, a stronger traction is required in articular fractures without loss of substance than in those accompanied by a loss of substance. In all the author's cases, consolidation began about the end of the first month and was always completed at the end of the second month. Extension could accordingly be stopped after a period varying from four to six weeks. The screws were remarkably well tolerated and did not work loose, except in two cases where it was necessary to reinsert them at the end of four weeks. Immediate active mobilization was instituted in 10 and 14 intra-articular fractures with very satisfactory results.

Willems (Belgium).

One of the essential points concerning which the experiences of the war have apparently resulted in more or less complete general agreement, as emphasized by Doctor Willems, is the rule that continuous extension is in a general way to be preferred to immobilization, the use of plaster of Paris having practically had its day. Another point, which is less generally admitted, is that those extension procedures which are applied directly to the lower fragment of the fracture are preferable, other conditions being equal, to the other methods for the following briefly enumerated reasons: Accuracy of the traction, full utilization, without waste of the entire applied

force, hence the possibility of accomplishing the object through a minimum force; possibility of mobilizing the joints from the start; possibility of leaving nearly the entire surface of the limb exposed, of treating the wounds if necessary, of taking care of the skin and muscles.

Willems's screw extension apparatus, a modification of Steinmann's direct extension method, was very frequently utilized by the originator and his assistants, both during and since the war. It has been adopted by other Belgian and foreign surgeons, and has proved very satisfactory; it was found to be convenient and very efficient from the viewpoint of reduction. The principal advantage of the screw extension apparatus as compared to all the other direct-traction appliances consists in the possibility of correcting angular deviations, meaning a deficient parallelism of the axis of the two fragments. These so-called angulations share the responsibility with shortening of the limb, for bad functional results after fractures, from almost complete uselessness to more or less painful claudication. The Willems apparatus is easily capable of correcting or preventing these deviations, through a change of the traction from axial to lateral, by a simple manipulatin of the stirrup, the essential working part of the appliance. The accomplishment of the desired object is easily controlled by means of radiography. In view of the serious danger of impaired final function through angulations, the advantages of the Willems screw extension apparatus would seem to be self-evident.

Ferraro(Italy). The following conclusions were suggested by Dante Ferraro, Lieutenant Colonel Médecin de la Marine Royale Italienne. As the number of amputated and crippled after bone and joint injuries is still too large (30 to 40 per cent of permanent invalidism), and as this outcome is largely due to a lack of continuity in the treatment, a single national organization is recommended in the form of a military service, coordinating the Red Cross services, university centers, and special clinics for cooperative work in the fields of radiology, traumatology, orthopedics, and prostheses.

Upon the basis of war experience, the congress was asked to recommend:

1. Mobilization at the onset of hostilities, in special traumatological hospitals, of already established surgical groups in civil practice and in the army (hospitals,

Red Cross, university centers, medical schools, surgical clinics of large cities, etc.). A list of specialists should be kept on file by the general medical administration of the war ministry, with an obligatory official half-yearly report on the changes in the personnel, as adopted by the above-named directors.

2. The hospitals, or specialized centers for lesions of the limbs, are to be placed in the rear of the fighting front (not farther than six to eight hours by train or autobus). As far as possible, fractures of the limbs should be treated in the same hospital until anatomical healing has occurred. For functional restoration and prosthetic or cineplastic appliances, the patient should be sent to physiotherapeutic centers.

3. The first-line ambulances at the front should be well supplied with apparatus and the most perfect appliances for direct immobilization, which can be left in place for transportation as well as treatment. Uniform antiseptic routine treatment of wounds is recommended, with surgical intervention only in emergency cases (shock, profuse hemorrhage, crushing of limbs). Hemostasis is to be obtained preferably by means of vascular ligature in the wound itself (mindful of the fact that the retention of the Esmarch bandage during several hours favors both gas gangrene and ischemic gangrene). Antitetanus injection should always be administered, also if necessary, antigangrene injections (antiperfringens, antivibriosepticus, antibellonensis).

4. Each traumatological center must have a complete and liberal radiological outfit, permitting the earliest possible preparation of two good radiograms of the fracture, in order to show the direction of the fragments and splinters, which assists reduction and coaptation of the fracture focus. Fractures should be set, if necessary, under general anesthesia, on the variously constructed traction beds, and the reduction be periodically controlled after application of plaster or metal appliances in order to verify the maintenance of the bone in good alignment. Walking apparatus should be employed when possible in view of the functional restoration of the limbs and joints, which is always to be aimed at. Osteosynthesis is to be performed at a late date (after extinction of the infectious focus), when it is not possible to accomplish or maintain the reduction of the fragments, and in the presence of pseudarthrosis, as well

as in defective coaptation after osteotomy of the callus. Autogenous grafts must be carried out under perfect asepsis (sterilized gloves and instruments, avoiding contact with the skin), always passing beyond the zone of eburnisation. A radiogram showing consolidation should supplement the others.

5. In case of emergency amputations or resections, the ultimate employment of cineplastic procedures and prostheses should never be lost sight of. In order to encourage patients to resume the functional use of their limbs, those who, with a cinematic or other prosthesis, succeed in restoring the normal standard of their occupational work should be given double annuities for 5 to 10 years. The suggestion was made that the conclusions as proposed for the treatment of fractures of the limbs should be embodied in an international summary of treatment.

Depage (Belgium).

The necessity for the establishment of *special sections* for fractures in the surgical services of modern hospitals was once again emphasized by Doctor Depage, of Belgium, who pointed out that in the existing hospital services, the advances accomplished during the war can not be taken advantage of, new outfits being required as well as trained attendants and physicians who know how to apply modern methods. He expressed the hope that the formation of such special sections would be given as one of the conclusions of the congress.

ANTITUBERCULOSIS CAMPAIGN IN THE ARMY.

The congress found that in order to be efficacious, the fight against the great white plague in the army must be based primarily on the strict adoption of hygienic measures. The desired improvements are of a collective and individual order generally recognized as efficient, with special reference to the quarters, physical education, prophylaxis against predisposing conditions, antialcoholic campaign, and improved living conditions in general. The educational antituberculosis crusade must have for its goal not only the medical advisers but the individual trooper who should be instructed by means of pamphlets, popular addresses, lectures, moving pictures, and similar procedures. In the existing circumstances of tuberculosis incidence, it seems advisable to keep an individual sanitary register for each soldier, as well as a medical record of his personal history and state of health

during the period of his active military service; preferably, also, including the time of service in the reserve. Repeated routine examinations of all the men are indispensable, especially in the course of the first months after admission to the army. Tuberculous individuals should not be admitted to the army, the selection to be made in two steps, first at the time of recruiting, then immediately after entrance into the army. From the prophylactic viewpoint, temporary or definite exclusion of all affected individuals is an imperative requirement as regards all tuberculous manifestations. It appears equally desirable to investigate the practical value of the various numerical indexes and biometric tests which have been proposed for the determination of body vigor, especially as related to tuberculosis and resistance against infection.

The organization of special services is recommended for the more efficient control of suspected cases. Members of the army medical corps should be given opportunity to attend a practical course of instruction in the diagnosis of tuberculosis.

Finally, the congress emphasized the need of permanent cooperation between the antituberculous civil administration and the military authorities. The former should be immediately notified by the army of any discharge from military service on account of tuberculosis.

Contributions to the important subject of tuberculosis control in the army were presented before the congress by 15 delegates, from Czechoslovakia, Denmark, England, Belgium, France, Japan, Sweden, Switzerland, Italy, Spain, Norway, and the Netherlands.

Franz (Czechoslovakia).

The first speaker, Dr. K. Franz, Professeur agrégé à l'Université Charles à Prague, Général-Médecin de l'Armée Czechoslovakia, pointed out the fact that the fight against tuberculosis in the army must be improved in several directions, and that besides general hygienic measures more importance must be attached to the individual antituberculosis education of soldiers in the ranks as well as inmates of military schools. Military surgeons should organize conferences on the subject of tuberculosis, and should be assisted by specially appointed lecturers who are provided with small transportable antituberculosis museums. Frequent holding of educational exhibitions, parallel with lectures delivered in a given locality, is recommended. Periodic courses of instruction should be organized for army physicians, in order to keep them

informed concerning recent tuberculosis research. It is advisable to preserve also in times of peace the selective and diagnostic stations for pulmonary diseases, which have been created and given satisfaction in different States in the course of the war, and to make them the centers of the antituberculosis compaign. The establishment of tuberculosis statistics, and also, if required, of other diseases of military interest, on a uniform basis for all States was suggested by the speaker as a future desideratum.

Hansen (Denmark).

In Denmark, as stated by Dr. C. T. Hansen, Chef d'Etat-Major du Service Sanitaire de l'Armée Danoise, according to a law passed in 1905, all men who contract tuberculosis during their military service are sent, when disabled, with their consent and at the expense of the State, to a tuberculosis sanitarium, hospital, or convalescent home, where they may stay a year or longer, as the case may demand. If the disease can be shown to have been contracted during military service, the man is entitled to a pension according to the degree of disablement. For admission to the army service, a medical certificate is required, showing that the individual is free from "contagious tuberculosis of the lungs or larynx."

Stirling (Britain).

In outlining the campaign against tuberculosis in the British Army, Major Stirling, of the Royal Army Medical Corps, stated that practically no special measures are adopted other than the effort to maintain a high standard of hygiene, both general and personal. The army is *voluntary*. Careful examination is made of all recruits on enlistment; none are accepted who show signs of tuberculosis or give a history of having suffered therefrom. Whenever the diagnosis of pulmonary tuberculosis is made, the soldier, if serving abroad, is invalided home at the first opportunity, and is discharged from the service, being transferred to a sanitarium by arrangement with the national health insurance commissioners. The speaker pointed out that whereas at one time pulmonary tuberculosis was nearly twice as frequent among soldiers as among civilians, with the building of modern barracks and strict attention to hygiene this condition of affairs is reversed, and the soldier now has much less chance of acquiring tuberculosis than the average civilian. The following form of notification is employed in these cases:

Army Form O. 1835 A.

NATIONAL HEALTH INSURANCE.

Notification of discharge of tuberculous patient.

For use in all tuberculous cases, irrespective of actual cause of discharge, except uninsured officers and uninsured nurses.

To the SECRETARY, NATIONAL HEALTH INSURANCE COMMISSION. { ENGLAND. / SCOTLAND. / IRELAND. / WALES. } See footnote overleaf.

SIR:

The patient of whom particulars are given below is leaving the service suffering from tuberculosis on _____ See note †

_____A medical report is furnished overleaf.

(1) Name in full { Surname _____ / Christian names _____

(2) Number, rank, and Regiment _____

_____

(3) Intended place of residence on discharge (address in full) { _____ / _____

(4) Were insurance deductions made from Army pay? _____

(5) For use if answer to (4) is in affirmative.

Is applicant a member of an approved society? _____

If so, states—

(i) Name and number of approved society. { _____ / _____ Number _____

(ii) Name and number of branch (if any). { _____ / _____ Number _____

(iii) Membership number in insurance book _____

(iv) Has applicant ever received a medical card? _____

If so, by what insurance committee was it issued? _____

(6) For use if answer to (4) is in negative.

Will applicant's total income from all sources on return to civil life (including prospective pension) ‡ be more than £160 per annum? _____

Date _____ Hospital _____

_____

Signature of officer in charge of military hospital.

Address _____

For use only where residential treatment is considered essential (see (5) overleaf).

PART A.	PART B.	PART C.
(To be signed by applicant.)	For use if applicant refuses to sign Part A.	For use if applicant has signed Part A.
I hereby apply for sanatorium treatment, and I declare that the particulars above are correctly stated. I undertake to conform to the rules of any institution into which I am received for treatment.	The patient, for whom I consider residential treatment to be essential, refuses to sign Part A.	The patient † is / is not being granted furlough.
Signature of applicant:	Initials of medical officer	Initials of medical officer .....
Date.....		† Delete inappropriate words.
See footnote § below.		N. B.—If furlough is being granted and patient is proceeding temporarily to an address other than that given at (3) above, particulars of the temporary address, and duration of stay there, should be given in a covering letter.

† Enter in the case insured officers, the date when commission will be relinquished, and, in other cases, the discharge from the Army will take effect.

‡ Inquiries from a patient as to the likelihood of a pension being awarded him, should be dealt with as indicated in paragraph 7 of A. C. 1. 2176 of 1916.

§ Article 4 to the Royal Warrant relating to pensions provides as follows:

"Half the pension and allowances (if any) awarded . . . may be subject to the condition that the disabled man shall undergo medical treatment at a sanatorium, hospital, convalescent home, for any period during which it may be certified that such treatment is necessary in the interests."

Article 6 (5) of the Royal Warrant provides for additional allowances being made to dependents of a pensioner during his treatment in a sanitorium.

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The following extract from a report made in 1861 by the royal commission for improving the sanitary condition of barracks is of interest: "Before the soldier can be assured of having the amount of space required for health, there must be a distinct recognition that the amount given by regulation (i. e., 600 cubic feet) is on no account to be tampered with. No increase of regimental strength, no want of storerooms, libraries, or reading rooms should for an instant be permitted to interfere with it. It would never be pleaded, as a reason for reducing the soldier's ration of bread and meat, that a larger number of men had joined the regiment than the commissariat could provide for. Why should the soldier's air ration, which is equally important for his health and efficiency, be differently dealt with? In any case, overcrowding should utterly be put an end to. They have not been aware that, if above a certain number of men are placed in a given cubic space, the lives of some of these men, and the health of others, is certain to be sacrificed."

During the years 1837–1846, the mortality from pulmonary tuberculosis among the footguards reached 11.9 per 1,000 of strength. From 1864–1870 it had fallen to 2.3 per 1,000. In the British Army in 1913, it was 0.25 per 1,000. During the war, men fit to carry on were not invalided, and many who had suffered from tuberculosis showed marked improvement after a period in the trenches.

A chart showing the ratio per 1,000 of strength—invalids and deaths from pulmonary tuberculosis from 1860–1913—is a valuable addition to Stirling's interesting and very instructive paper.

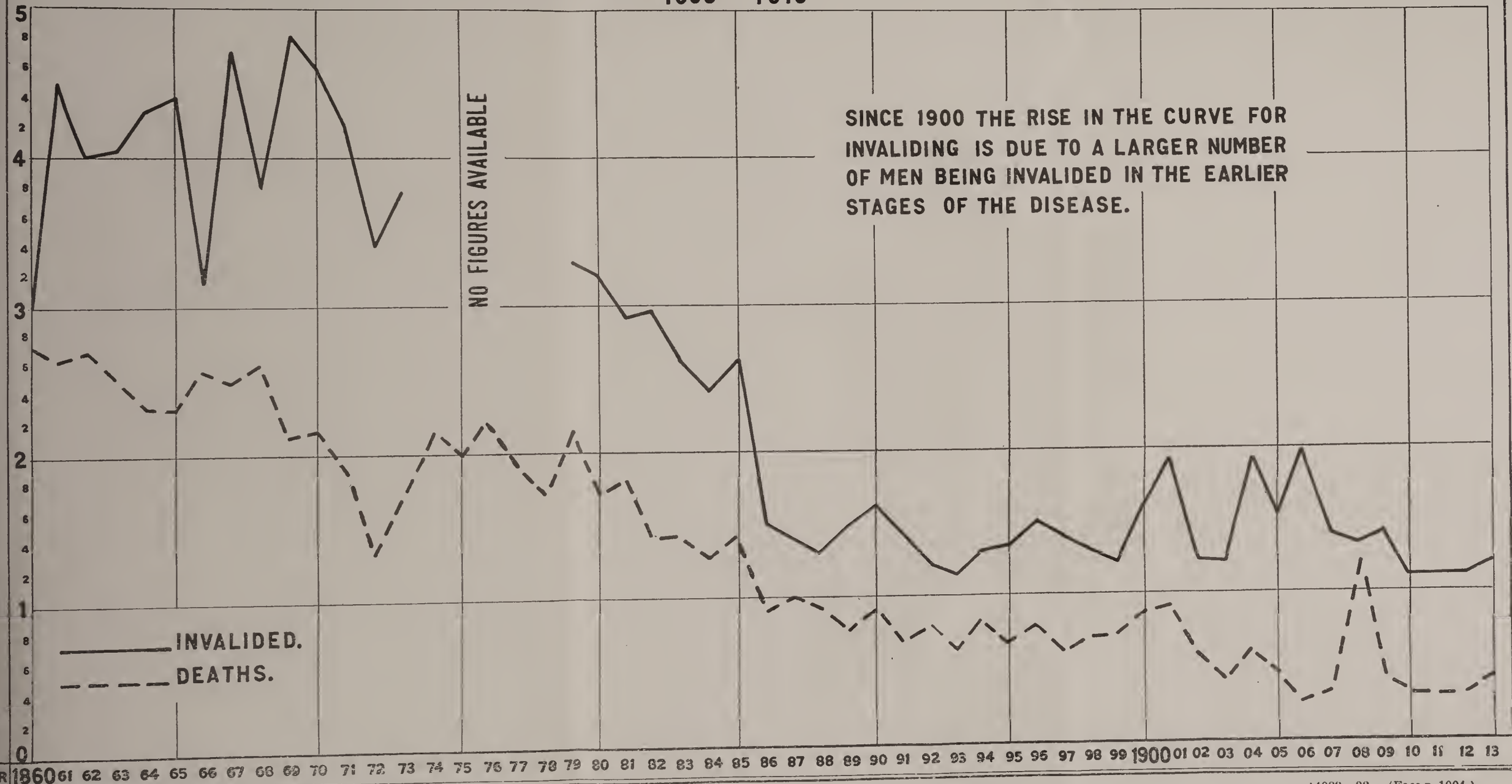
Collard and Spehl (Belgium).

One of Belgium's contributions to the subject of tuberculosis control in the army, presented by Drs. Armand Collard and Paul Spehl, Médecins de Bataillon de 1re classe de réserve, Attachés a l'Hopital Militaire Anglo-Belge (Bruxelles), begins by emphasizing the necessity of protecting healthy individuals, of discovering and treating suspected and positive cases, of reclaiming the latter and insuring them the benefit of social assistance.

I. Protection of the healthy soldier is guaranteed by improved conditions in the barracks, especially as regards overcrowding, permanent ventilation of the premises, attention to cleanliness, careful destruction of filth

CHART SHOWING THE RATIO PER 1,000 OF STRENGTH IN THE BRITISH ARMY, INVALIDS AND DEATHS FROM PULMONARY TUBERCULOSIS, AT HOME AND ABROAD.

1860 — 1913



and waste matter, control of the soldier's personal hygiene. Protection of the healthy is to be further insured by: (*a*) Organization of physical training based on compulsory educational exercises. The Ling method lends itself best to the requirements of this education. (*b*) Careful supervision of the military exercises, which must be graduated so as to guard against overexertion. (*c*) Institution of appropriate measures for the control of possible direct contagion through coughing cases. (*d*) Antituberculous education of the soldiers by short popular talks by army surgeons, instructive pamphlets, cinematographic pictures, and general distribution of knowledge.

II. The earliest possible discovery of suspicious and positive cases is an urgent problem in the Belgian Army. For the time being the recruiting boards permit too readily the enlistment of tuberculous individuals, and these boards should be reorganized so as to exact a more thorough medical examination of applicants. It is necessary for this purpose: (*a*) To take into consideration the pathological past of the recruits; (*b*) to keep on file individual medical records covering the man's entire military career, including the reserve period. It is desirable for this record to include biometric measurements indicating the general nutrition and respiratory function. Biometric measurements have very recently been introduced on a limited scale with other improvements in the Belgian Army on the recommendation of the hygiene advisory board. The traditional measuring of the thoracic circumference is now supplemented by spirometry and the formulas proposed by Prof. Emil Spehl. These relations (difference between the weight and the height in centimeters, indicative of the vital capacity) are easily calculated and permit the rapid classification of recruits in a more accurate manner than by means of thoracic measurements. The examination of doubtful cases should be intrusted to a competent service, submitting to bacteriological analysis the sputum of all patients suffering from bronchitis or related conditions.

Selection centers should be organized and provided with a staff of specialists and material equipment up to the modern diagnostic standard of tuberculosis. The surgeons attached to these centers should have the final vote on exemptions from military service and also on the eventual discharge of already enlisted men. The opera-

tion of all these centers should be conducted under one general direction. The centers should serve at the same time for instructing in phthisiology, an at present neglected field, and young military surgeons should be obliged to attend these courses.

In the time interval between the recruiting formalities and the actual enlistment a man who has been found fit for service may be attacked by the disease, and another medical examination is therefore required at the time of entrance into the army to decide on his being discharged or kept under observation as outlined above. The age of 20 to 21 years seems to be the most suitable for enlistment. No semiinvalid stretcher bearers should be utilized in the auxiliary services, but this work should, on the contrary, be intrusted to especially strong and resistant men. The first months of military life demand a specially careful medical supervision based on repeated clinical examinations and periodic measurements of the body weight and respiratory function.

III. As regards the handling of tuberculous patients, the most favorable therapeutic conditions exist in a medico-surgical hospital restricted to the treatment of tuberculosis in all its stages. Seaside hospitals, sanitariums in the plains or mountains, are indispensable adjuncts. In order to ascertain the contagious or predisposing factors which may have been effective in the case of tuberculous soldiers, it is desirable for the military authorities to conduct a medico-social inquiry in their homes, to be carried out by a visiting nurse.

IV. Military disablement is to be applied to all positively demonstrated manifestations of tuberculosis, and should involve an invalidity pension of 100 per cent as long as symptoms are present rendering rest imperative. Later on, the rate of pension as determined by specialists will vary, but must never fall below a certain percentage to be determined for every bacillary manifestation, this percentage to be in conformity with the functional incapacity which is considered as irremediable, and to be increased whenever required by an aggravation in the condition of the patient. The family of the tuberculous soldier is entitled to a supplementary allowance during the patient's stay in the hospital or sanitarium.

V. Connection with civil organizations: A permanent connection is required between the civilian antituberculous services and the military authorities, these services

to report at the time of recruiting the names of those men who have applied to them; and the army, on the other hand, to indicate the soldiers discharged for tuberculosis to the management of the region where they are going to reside. It is desirable for the army to give its financial assistance to the civil organization, so that the disabled soldiers may enjoy the advantage of the institutions belonging to the same, in the form of agricultural settlements, reeducational centers, occupational advisory boards, and other suitable institutions.

Sacquépée (France).

The Prophylaxis of Tuberculosis in the French Army in Peace Time is the suggestive title of the paper presented to the congress by E. Sacquépée, Médecin principal de 1re classe, Professeur à l'Ecole d'Application du Service de Santé Militaire, who adds a number of valuable hygienic recommendations—more essential to a cure than medicinal agents—for patients suffering from disturbances of the respiratory passages. The prophylaxis of tuberculosis in the army aims at avoidance of the introduction, development, and propagation of the disease. Its operation is based on the simple principle of eliminating tuberculous recruits, while collaborating as far as possible toward national prophylaxis; but the prophylactic work must be continued during the entire course of the soldier's service. According to the official rules for determination of physical fitness for military service, the different manifestations of tuberculosis are always a reason for removal from the army, this removal being temporary or permanent, according to the nature of the case. The most important form of the disease as regards prophylaxis is represented by pulmonary tuberculosis. Regulations must always be in force to prevent the admission of tuberculous individuals who endanger the health of the entire military community, and whose removal must be accomplished as promptly as possible so as to insure an efficient prophylaxis. Unfortunately, the manifestations of the disease, more particularly those of pulmonary tuberculosis, do not always permit a positive and early diagnosis. Precautions are taken, however, to eliminate not only the positive but the suspected cases. The law ordains the elimination from the army of men suffering from visceral tuberculosis, no matter how slight the indication of the disease. In the *absence* of distinct signs of visceral tuberculosis, more particularly pulmonary tuberculosis, the men are accordingly enlisted, pro-

vided they are free from other infirmities. As a matter of fact, tuberculosis may really exist in a latent form, which may flare up at any instant, and it is for the best possible avoidance of imperceptible or latent lesions, as well as for the maintenance of good general health, which is the best protection against the disease, that an entire series of hygienic prophylactic measures are instituted as the soldier's daily routine.

All known tuberculous individuals are removed from the army, at least temporarily. But the interest of the army is not alone concerned in the fate of these men, who must not be allowed to become foci of contagion when they return to civilian life. A special course of education is therefore provided in the hospitals where the necessary isolation and treatment of these patients are carried out. After his discharge, the educated tuberculous patient is not left to his own resources, but has learned where to turn to obtain financial assistance and the necessary care. While eliminating all diseased individuals and protecting itself against contagion, the army endeavors to contribute its share toward the great work of national prophylaxis.

Kensa Oyama (Japan).

Japan was represented at the congress by Surg. Lieut. Col. Kensa Oyama, who gave a short address on precautionary measures in use in the Japanese Army. After pointing out that the disease since 1918 is unfortunately on the increase in the army, no less than in the entire nation, the speaker emphasized the urgent necessity of prophylaxis and local sanitation. The following measures are in use in the Japanese Army at the present time: At the time of recruiting, all men are carefully examined as to their heredity, constitution, and physique, especially the throat and chest. Recruits on entering the barracks are subjected to examination of the body, urine, feces, and sputum, sometimes also a von Pirquet skin reaction. Doubtful or suspected cases are sent to a stationary (garrison) hospital, while emaciated or anemic men are watched and repeatedly examined. At least once a month all the soldiers in the barracks are examined as to their physical condition and body weight, which are noted in a special register. On the appearance of suggestive symptoms, the soldier is classified under the heading of suspected cases. Such men are excused, entirely or in part, from military drill and other service.

Clothing, bedding, and tableware are furnished strictly for personal use, and no mixing or common use should occur, as each man is expected to wash his own tableware. These utensils are frequently disinfected or cleaned, and likewise the masks and gauntlets used in fencing and bayonet exercises are disinfected every time they are used. Pleurisy is considered and treated as a disease of tuberculous character, and all these patients are sent to hospitals. Their clothing, bedding, tableware, and rooms are disinfected by means of steam or other disinfectants. Some patients, after making a rapid and complete recovery, are discharged from the hospital and rejoin the troop, but the great majority are removed from military service, experience having shown that the latter may be entirely cured by the change of climate and living conditions, whereas the former have a tendency to relapse. The relief department of the Japanese Red Cross Society is intrusted with the care and treatment of men who are discharged from military service on account of tuberculosis.

Meagher (Britain).

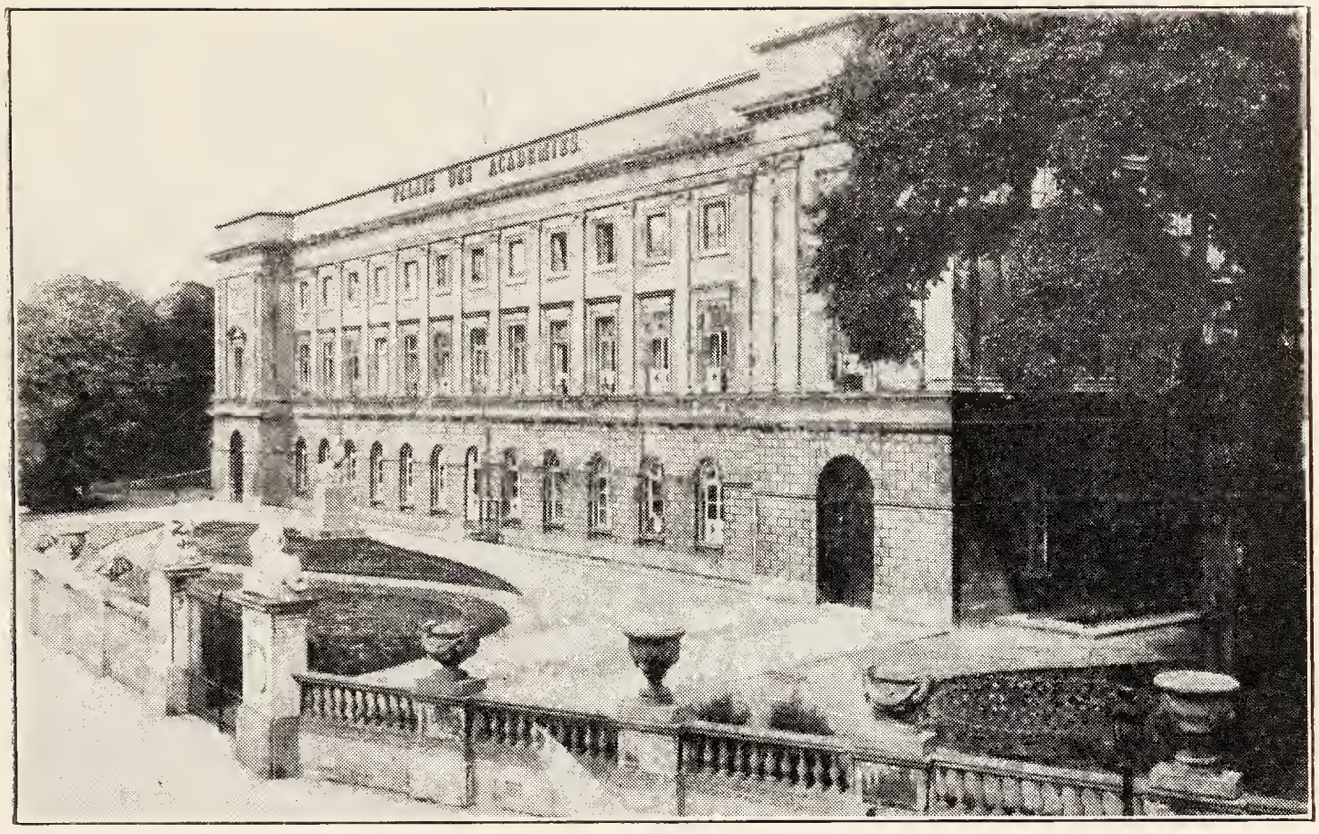
Surg. Commander E. T. Meagher, Royal Navy, in his contribution to the subject, considered the problem of tuberculosis and its prevention in the British Navy from the viewpoint of the nonspecialist naval medical officer. The following regulations or routine, which were in force in the navy during the war, can, in his opinion, be correctly viewed as of operative utility in the campaign against tuberculosis, although statistics relative to the war are not yet available. (1) Health lectures, which are delivered periodically to the crews of the ships by their medical officers, include instruction in the nature, danger, and prevention of tuberculosis. (2) Ventilation of ships. Of recent years considerable attention has been given to this subject, and structural improvements have been introduced. (3) The crew is exercised daily, and the "Physical exercises" which form a part of the routine, are framed in such a manner as to insure a full and free expansion of the chest and are a valuable aid in maintaining a healthy condition of the lungs. (4) The body weight of each member of the crew is taken periodically, and a record is kept. If it be remembered that a loss of weight is usually concomitant with tuberculosis, it is evident how valuable a measure this continued observation is, as being likely to attract notice in case infection

has insidiously established itself. (5) A thorough physical examination of the chest is directed to be made periodically, and the result is noted on the man's medical history sheet, which accompanies him throughout his service career. (6) Regulations are in force, the object of which is to prevent the raising of dust when decks or wards are being swept. (7) Men suffering from pulmonary tuberculosis are not retained in the service afloat. A tuberculosis subject is considered to be a source of danger to others with whom he has to live in such close continuity, and in addition to this, the life at sea in a man-of-war is decidedly unsuitable for incipient lung disease. At sea in rough weather, it is often difficult on board a man-of-war, especially so in the smaller craft, to keep the atmosphere between decks pure.

Tuberculosis control in the Swedish Army.

The fight against tuberculosis in the Swedish Army is fundamentally based upon collaboration with the civilian sanitary authorities, and rests on the measures provided for the protection of the community. Antituberculosis measures in Sweden are governed in a general way by international hygienic principles, including general precautions of social character, promulgation of information, and foundation of sanatoria. Since 1912 all members of the army, including noncommissioned officers and troopers, are entitled to sanatorium care at the expense of the nation during the duration of their service and up to one year after their discharge from the army. Steps concerning admission are taken through the medical officers. The daily costs are stated in advance, in the form of approximate estimates, after which an arrangement is made at the end of the year between the directors of the hospital and the administration of the medical service of the army. Pulmonary tuberculosis in particular is strenuously fought in the garrisons by means of strict hygienic measures and spreading of knowledge on the subject of tuberculosis, through lectures, addresses, or health talks, held by military as well as medical officers. The findings on examination of the men at the time of entrance are noted on special medical cards. A set of regulations were published in February of 1920, dealing with the routine fight against contagious diseases in general in the Swedish Army.

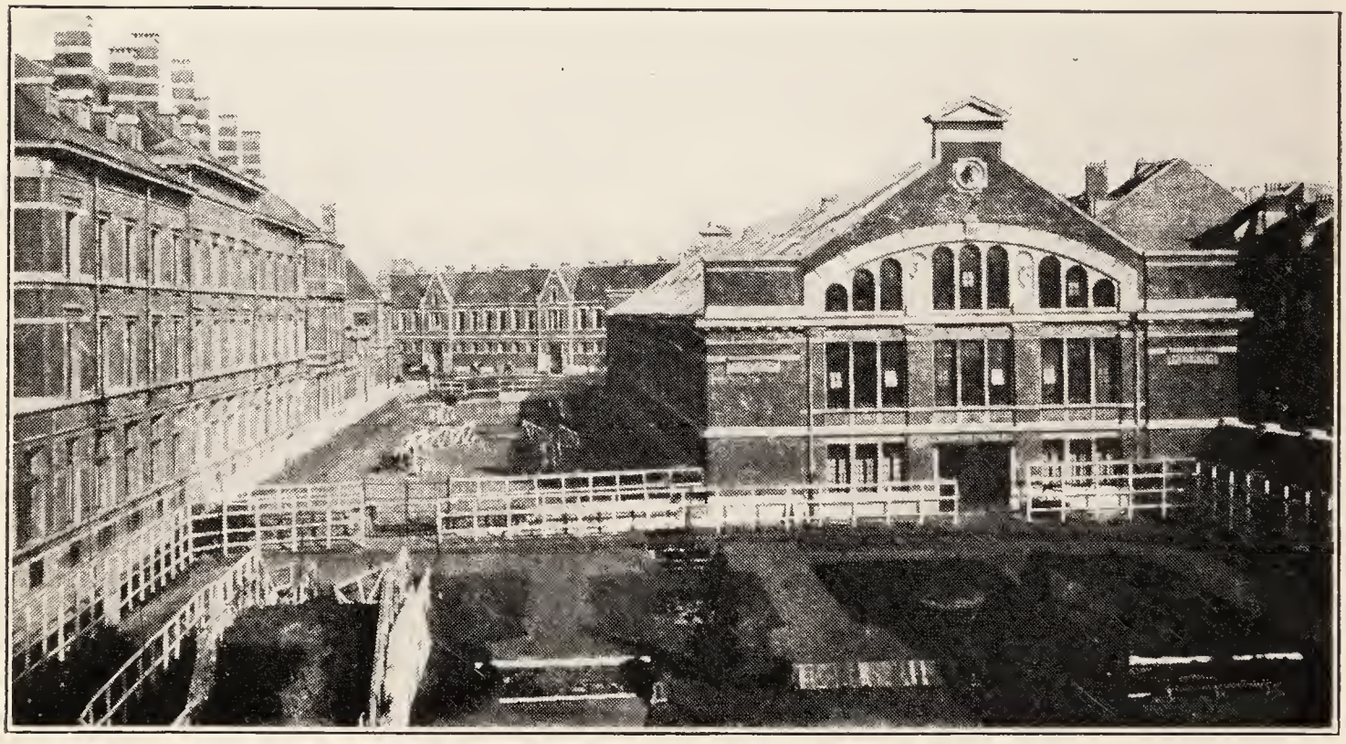
The number of tuberculosis hospitals in Sweden amounts to 4,861; the larger towns and a certain number



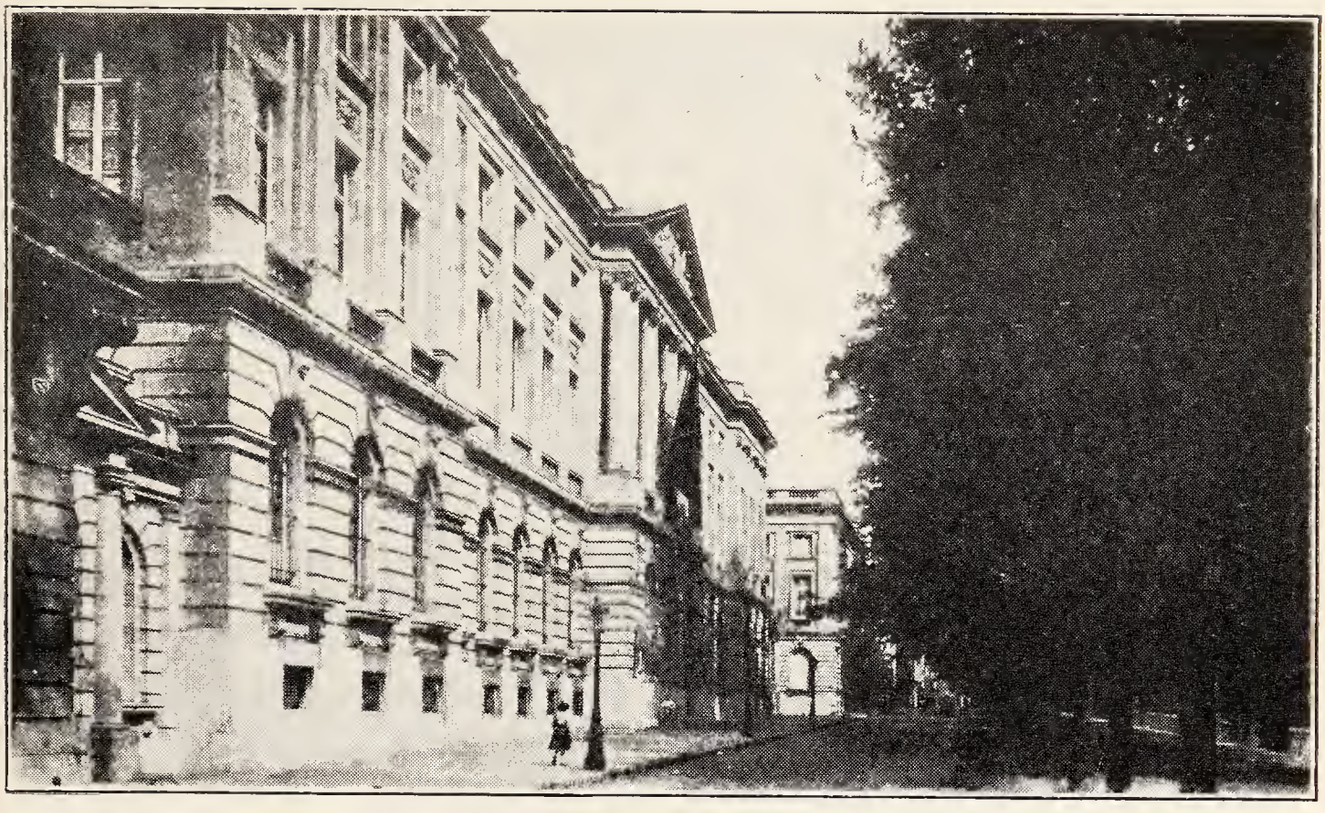
BRUSSELS. THE PALAIS DES ACADÉMIES USED BY THE GERMANS AS A MILITARY HOSPITAL.

BRUSSELS. THE GREAT HALL OF THE PALAIS DES ACADÉMIES, CONTAINING MURAL DECORATIONS DESCRIPTIVE OF THE HISTORY OF BELGIUM, CONVERTED INTO A HOSPITAL WARD BY THE GERMANS.

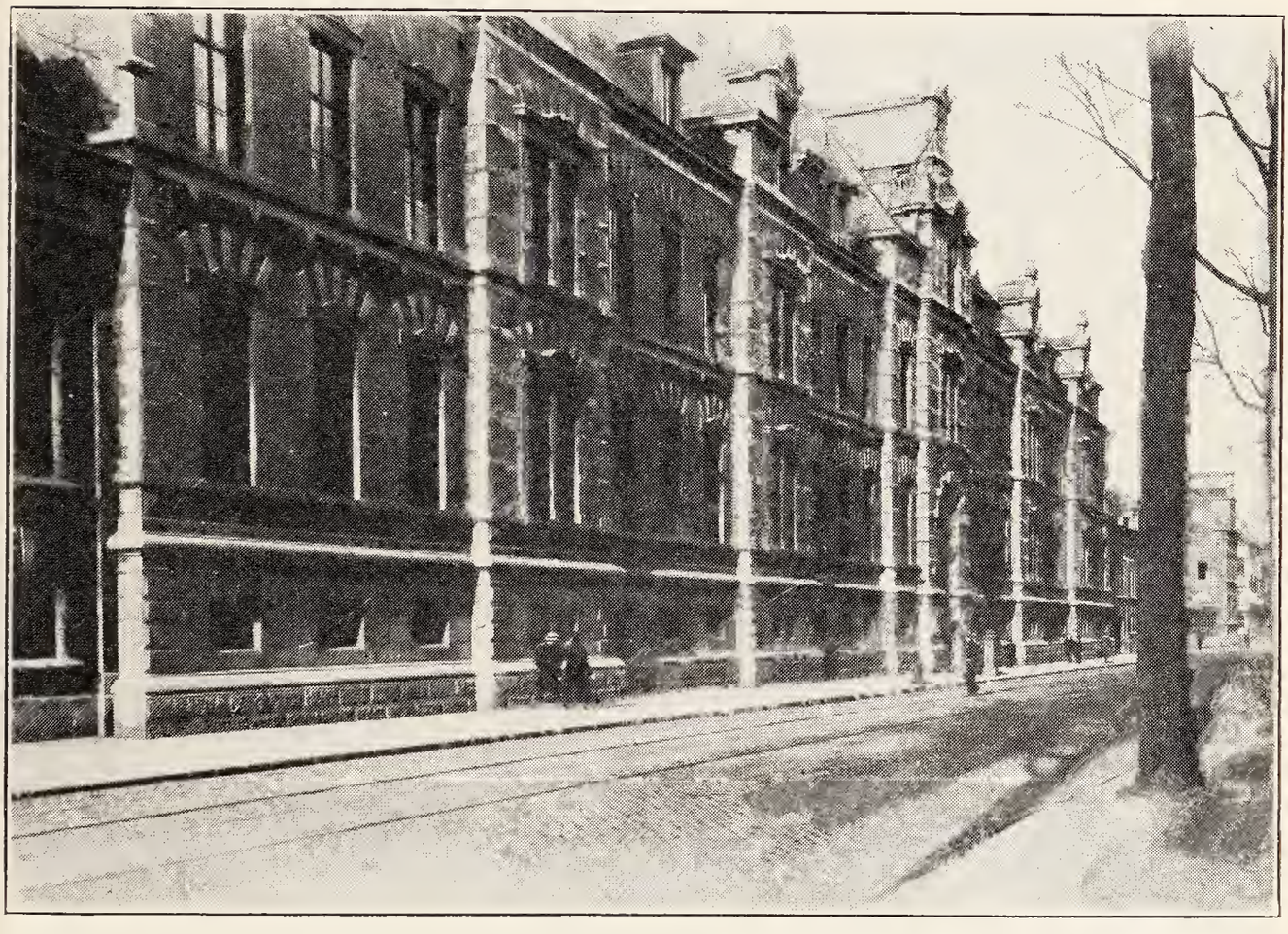
BRUSSELS. THE STUDENTS' QUARTERS AT THE MILITARY SCHOOL.



BRUSSELS. THE RIDING ACADEMY AT THE MILITARY SCHOOL.



BRUSSELS. THE MILITARY SCHOOL FOR OFFICERS.



BRUSSELS. THE MILITARY HOSPITAL.

BRUSSELS. A TYPICAL WARD IN THE MILITARY HOSPITAL.

BRUSSELS. INTERIOR COURT OF THE MILITARY HOSPITAL.

of rural communities have dispensaries, about 160 altogether. Both the hospitals and dispensaries receive aid from the State for their maintenance. Associations against tuberculosis exist in all districts, headed by an association covering the entire country, under the name of National Swedish Association against Tuberculosis. The percentage of deaths due to tuberculosis in 1901 amounted to 1.90 per thousand inhabitants. In 1918 the mortality percentage was 1.45, or a reduction of about 24 per cent.

Nienhaus (Switzerland).

Colonel Nienhaus, of the Swiss Army, Médecin de division de la 6e division, pointed out that the fight against tuberculosis, which has been extended in recent years, has yielded such favorable and encouraging results, as proved by numerous statistics, that it would be "a crime" not to keep up this fight in behalf of the civilian as well as military population. Among soldiers a distinction can be made between three different forms of tuberculosis: (1) Recent infection during service in apparently healthy individuals, without clinical signs of latent infection. Theoretically, these infections may occur, although they will always be exceptional, but no precaution can be taken for their avoidance. (2) Aggravation of disease already in evidence before admission to the service, but not discovered at the time of enlistment. (3) Development of a latent tuberculosis during the service, in soldiers who were in good health, fit for work, and free from all signs of disease at the time of entrance into the service. The last two named forms, in particular, must be eliminated from the army as promptly as possible, in order to guard against the danger of contagion in the environment.

In the Swiss Army the fight against tuberculosis is waged by means of sanitary examination at the time of enlistment and entrance into military service, these examinations aiming at the elimination of all tuberculous cases before admission to the service; by medical supervision during the service, for the purpose of removing diseased individuals from the troop, watching the general state of health, and teaching prophylaxis against infectious diseases; and by appropriate treatment of the sick. This treatment is carried out in sanatoria, according to the rules of modern phthisio-therapy, and is pro-

vided for by the law of June 28, 1901, dealing with the insurance of soldiers against diseases and accidents.

Mendes (Italy). The fight against tuberculosis in the Italian Army, during the war of 1915–1918, was graphically described by Prof. Guido Mendes, Tenente Colonnello Medico, who showed to the congress that a new start in this direction was made after the military administration had secured the valuable cooperation of the two largest State sanitary organizations, i. e., the Public Health and Association and the Red Cross. Purposeful measures could now be instituted for the discovery of incipient and masked cases of tuberculosis which are often misinterpreted, and after a few months of military life result in the onset of grave conditions of open tuberculosis, fatal for the patient and dangerous as regards the propagation of the infection. Regional sanitary centers were established for the reclamation of tuberculous prisoners, exchanged from Austria, such as the Nervi center and the center of the Tiburtino Hospital, near Rome, followed by the institution of another large sanitary center near Bologna, for tuberculous cases coming from the troops in the fighting zone. One of the greatest difficulties encountered by the military administration, seeing the scarcity of such institutes in Italy and the unjustified opposition of the people against their erection, even in special localities of the large urban centers, concerned the establishment of tuberculosis sanatoria. Valuable assistance for the foundation of sanitary camps was given to the military authorities by the general administration of public health and the Red Cross Society. In these sanitary camps and hospitals, which were founded for every corps of the territorial army, the tuberculous soldiers remained for a period of about three months, at the end of which time further beneficial measures were continued in their behalf, according to a special agreement between the war ministry and the ministry of the interior.

Costa (Spain). According to Commandant Médecin A. Costa, Professeur à l'Académie de Santé Militaire, the most reliable measure for the avoidance of tuberculosis in the army consists in preventing the admission of infected individuals to the barracks, for, being germ carriers, they will cause contagion of the other soldiers within a very short time. Exemption from military service in Spain provides for the exclusion of all known tuberculous in-

dividuals, those who present advanced lesions as well as those who are in the incipient stage, the latter, of course, being kept under observation in order definitely to prove the existence of the lesions. By order of a health committee of the army to the war ministry, a monthly review is held, in which all patients who are suspected of suffering from pulmonary disease are at once segregated and subjected to a very strict examination. As soon as a man is found to have the least sign of tuberculosis, he is put on the discharge list. All medical officers give a monthly address on the subject of hygiene, and point out the necessity of obeying hygienic rules for the avoidance of infection. A separate ward in good hygienic condition should be provided in the barracks for the reception of men who are suspected of having the disease, where they can be observed without coming in contact with the others. Men with a low physical resistance should be very frequently examined, as these individuals are usually tuberculous. Military tuberculosis sanatoria should be established for the treatment of soldiers who have contracted the disease in the army, and from which these patients should be sent home in good health, if possible.

Reichborn-Kjennerud (Norway).

In Norway, according to Dr. Reichborn-Kjennerud, Médecin Divisionaire, the inmates of all miltary schools and garrisons are subjected twice yearly to a complete examination of the respiratory organs. Cases which are classified as suspects, as well as positive cases, are evacuated to civilian hospitals, for treatment at the expense of the State. After the general examination of the men at the time of enlistment, the recruits are once again examined by a specialist during the first month of service, in order to detect any cases of latent tuberculosis. The demonstration of pulmonary tuberculosis, no matter of what degree, requires exemption and definite discharge from military service. The outcome of this examination is registered on a double file, one being sent to the divisional medical officer, and the other to the medical authorities of the recruit's home community. The divisional medical officer collects the individual statements and prepares a list of statistics which are forwarded to the chief of the army medical service. In case a soldier has contracted tuberculosis during his service, he is treated in a civilian sanitarium at the expense of the Govern-

ment. Statistical figures were not yet available at the time of this report to the congress, as the above rules of the fight against tuberculosis have only been in force for two years past.

Ten Hove (Netherlands). According to Lieut. Col. Dr. Ten Hove, sanitary stations (sanatoria) are utilized in the Netherlands in the fight against tuberculosis in the army. When the disease has been diagnosed, the chief of the medical service may recommend that the patient be cared for in a sanatorium during a period of six months, at the expense of the Government, provided the soldier has completed three months of military service prior to this development. The chief of the medical service arranges for a further examination by a specialist, in order to decide if the suggested course of treatment is likely to lead, if not to a cure, at least to a considerable improvement. The patient's preference concerning the choice of the sanatorium is given consideration as far as possible. The treatment may be prolonged during several terms of three months by the authorization of the chief. According to a circular inquiry covering 12 months, one-half of the inmates of sanatoria left with very good results. When the medical director of the sanatorium and the controlling medical officer are agreed that further stay is useless, the patient is transported into a military hospital where he may remain as long as hospital care is needed, unless he prefers to go home. Those who, after their departure from the sanatorium or hospital, are able to work without being able to resume their former occupation, can be reeducated for new work, the Government bearing a part of the expense for this reeducation.

Granjux (France). Doctor Granjux, Médecin Major de 1re classe en retraite, as the representative of the Society of Public Welfare and Sanitation, summarized the question of tuberculosis in the army in the following approved statements: In peace times, tuberculosis contamination in the army is rare, the existing cases being the result of failure of recognition at the time of enlistment or admission to the service, or an exacerbation of a latent tuberculosis without apparent manifestations at this time. To begin with, as the cases of military tuberculosis are cases of civilian tuberculosis carried into the army, two conclusions result: (1) All measures taken for the protection of the future soldier, namely, the child,

against tuberculosis will render this disease more and more uncommon in the army; (2) measures must be instituted which permit the detection of tuberculosis at the time of enlistment as well as after entrance into the army. Whenever tuberculosis is claimed as a cause of exemption, the man should be asked to support his claim by a certificate, to be furnished him gratis by the antituberculous dispensary of the department, which has at its disposal all the means for the detection of this disease. A service equipped like the antituberculous dispensary should be organized in the military hospital at the headquarters of every army corps; to functionate especially for the radiographic examination of all suspected recruits who should be sent to this hospital for the above-mentioned examination. The conclusion seems to be justified that such precautionary measures would effectively prevent the introduction of tuberculosis into the army, where the disease would consequently become more and more exceptional.

De Block (Belgium).

Special attention was called by Doctor De Block, Commandant, Professeur d'Hygiéne à l'Ecole Militaire, Bruxelles, to the great divergence of opinions as regards the value of the many mathematical formulas which have recently been introduced into science and change the valuation of tuberculosis. Although the formulas of Spehl rest on certain definite principles, this does not seem a reason to reject the formulas of other authors. Prof. Emil Spehl, of the University of Brussels, propounded in 1919, a new adjuvant diagnostic method for the recognition of pulmonary "pretuberculosis," based on the demonstration of insufficiency of the vital capacity and a less than average body weight. The "vital quotient" is obtained by multiplying the weight, estimated in hectograms, by the thoracic perimeter estimated in centimeters, and dividing the product by the height, in centimeters. In a general way, the relation between the vital capacity and the weight is the measure of the "breath"; other conditions being equal, it indicates with nearly mathematical accuracy the physical strain of which a given individual is capable. All nontuberculous persons whose weight and vital capacity, in proportion to the height, are below normal, must be regarded as pretuberculous pulmonary cases, and should accordingly be subjected without delay to appropriate treatment. Spehl claims that the determination of the general nu-

trition and the exploration of the mechanical phenomena of respiration constitute together a new and most valuable method of examination in the difficult diagnosis of "pretuberculosis."

The question arises, Should these mathematical formulas be abandoned—compared—or adopted? An international inquiry ought to be instituted to settle this important point. The army at this time possesses human material for the study of many relevant questions, but our anthropological knowledge is insufficient and in need of further extension. After pointing out that this duty should not be left to physicians exclusively, the speaker concluded his brief communication with the expression of the wish that in view of the primary interest belonging to the prevention of tuberculosis, the congress should suggest the desirability of ascertaining through the military mediums, by means of a universal inquiry, if it is correct to attach any value to the mathematical formulas which at present are claimed to give the equation of the body resistance; these mathematical methods, providing their value is established, to be adopted and applied by all physicians, on the basis of uniform data.

THE ANTIVENEREAL CAMPAIGN IN THE ARMY.

A considerable number of contributions bearing on the control of venereal disease in the army were submitted to the "Congrès International de Médecine at de Pharmacie Militaires" in appreciation of the fundamental importance and imperative necessity of antivenereal measures. As a corollary of these offerings, the congress advanced official recommendations in behalf of a most rigorous antivenereal campaign, as called for by the extent and gravity of the peril in the army and navy. Society as a whole, the civilian in the street no less than the soldier in the ranks, is concerned far more vitally than is generally realized in the control of these insidious infections. In order to stamp out all infectious foci in the community, thereby indirectly guarding against contamination of the army, on land and sea, the fight against venereal disease must be waged primarily among the civilian population. Judicious educational measures, from didactic instruction to the cultivation of sports and games, are valuable prophylactics in the management of the venereal problem. When the infection

has been contracted, the latest and best methods of treatment must be rendered available for the soldier and sailor. It is recommended that in the armies and navies of all nations, the antivenereal campaign in all modalities be organized or modified without delay, namely, in conformity with the following principles:

A. Educational measures, to the widest possible extent.

B. Measures aiming at the preservation of healthy bodies and minds, through (1) provisions for amusement and entertainment, recreation rooms, athletic activities, and social centers of various kinds; (2) supervision of sources of infection, in cooperation with the civilian authorities; and (3) conservative protective measures, by providing prophylactic cabinets for soldiers and sailors, on the plan of the American prophylactic stations, amply supplying individual combs, brushes, soap, and similar utensils to the men.

C. Measures concerning syphilitic patients: (1) Early detection of infected men; (2) isolation of contagious cases; (3) treatment by the most efficient means in specialized services; (4) follow-up supervision of patients; (5) patients who are discharged before they are entirely cured must be given the necessary information as regards stations where they may secure treatment in civilian life.

Dujardin (Belgium).

With special reference to the control of the venereal peril in the Belgian Army, Doctor Dujardin, after giving a brief historical review of this vexed problem during the World War and the lessons taught by the study of venereal questions confronting soldiers, proceeded to a discussion of the most serviceable organization of the antivenereal campaign in the army, from the therapeutic, prophylactic, and moral viewpoint. The conclusions arrived at in this report are briefly formulated as follows:

1. The medical antivenereal campaign in the army must include the two steps of (*a*) divisional services (ambulant treatment and differentiation); (*b*) a central hospital of large capacity possessing a well-equipped laboratory. Its scope and receiving capacity, as well as its various departments, may be calculated in advance, and its staff should consist only of competent surgeons.

2. Therapeutic procedures alone are insufficient, and should necessarily be supplemented by prophylactic and moral antivenereal education of the soldier, with the two-fold object of lessening the number of contamina-

tions, and especially of securing timely treatment, prompt interference being essential to the efficiency of therapeutic measures.

Damazio (Brazil).

Dr. Alarico Damazio, Médecin-Major de l'Armée Brésilienne, Professeur à l'Ecole d'Application Médico-Militaire, discussed the history of venereal prophylaxis, its application in civilian centers, its necessity from the social viewpoint, the fight of the venereal evil in military centers, prophylactic measures, attempts at eradication of this evil, and contributed comparative statistics showing conditions as they exist in Brazil and in other countries.

Statistical table showing the morbidity and mortality from venereal diseases in the Brazilian Army in 1919.

Diseases.	Per 1,000 men in the service.		Per 1,000 men in the service.		
	Discharged.	Died.	Cured.	Died.	Disabled.
Gonorrhea	60. 43	.....	958. 76	.....	0. 51
Syphilis	43. 68	0. 24	897. 84	5. 55	19. 59
Venereal chancre	65. 06	.....	965. 55	.....	.....

Statistical table showing the morbidity and mortality from venereal diseases in several armies, calculated per 1,000 men of the average number of troops.

Diseases.	Portugal, 1910.		Spain, 1916.		Argentina, 1917.		Brazil, 1919.	
	Morbidity.	Mortality.	Morbidity.	Mortality.	Morbidity.	Mortality.	Morbidity.	Mortality.
Gonorrhea	(1)	.....	25. 12	.....	62. 38	.....	60. 43	.....
Syphilis	8. 72	0. 06	19. 67	0. 02	6. 53	.....	43. 68	0. 24
Venereal chancre	95. 13	.....	21. 93	.....	24. 09	.....	65. 06	.....

[1] The figures for gonorrhea are included in those for venereal chancre.

The desired goal of elimination of venereal disease from the armies of all nations, as pointed out by the speaker, involves the urgent necessity of more energetic prophylactic work in this direction. General measures at present consist in the establishment of stations for individual prophylaxis and other stations where infected soldiers from the entire army may be "purified" as completely as possible, or rendered incapable of transmitting the disease to others. All governments must intensify their antivenereal propaganda by lectures and printed

pamphlets, in order to show the dangers of infection, the means of avoiding it, and the methods of combatting the disease. Certain penalties should be imposed upon the transgressors of prophylactic rulings or for negligence in their performance. Systematic regulation of prostitution is an imperative necessity, in civilian centers as well as in military zones, in peace time or in war, in conformity with the laws, penal codes, and military legislation of the various nations. Capable government officials of the nations represented at the congress were called on to organize a uniform legislation aiming at a humanitarian campaign against the venereal evil. The speaker called attention to the desirability of stimulating in military centers a love of sports in general and of providing recreations of all kinds, in order to help those who have chosen the career of the soldier.

Marriage of soldiers should be encouraged, the use of alcohol strictly prohibited, and abstinence from illicit sexual intercouse be forcibly urged. The maintenance of an excellent moral and physical standard in the troops will help to increase resistance and diminish exhaustion, thereby protecting the soldiers against the disease and making of them valuable propagandists of antivenereal prophylaxis in civilian communities. Liberal prizes should be awarded to all those who by their works or discoveries contribute to the suppression of this human plague. The speaker requested the proclamation of absolute scientific conformity with the methods in use in the United States of America, through which excellent results have been accomplished. An appeal to the Red Cross societies all over the world was recommended, for the purpose of organizing a concerted effort of prophylactic work against venereal diseases. In conclusion, the governments represented at the congress were urged to promote biannual meetings of specialists from all over the world for comparison of results and adoption of new procedures, so as to secure the greatest possible efficiency of the antivenereal campaign.

Ritchie (Britain).

The Leagues of the Red Cross societies was represented at the congress by the report on venereal diseases in armies by Lieut. Col. T. F. Ritchie, D. S. O., M. B., R. A. M. C., retired. Stress was laid on the fact that the preservation of health and maintenance of efficiency of the troops is the primary function of an army medical

service, both in peace and war. The prevention and cure of venereal diseases becomes, therefore, an important responsibility of the army medical service, these diseases being probably the greatest cause of disability in all armies. Accordingly, a well-considered policy in regard to venereal disease should be adopted by those responsible for the health of the army. These measures may be divided into preventive and curative. Preventive measures may be summarized as follows: Education as to the dangers and results of venereal diseases and their methods of spreading; organization of wholesome recreation and entertainment; diminution of opportunities for exposure to infection; medical prophylaxis. During the World War, prophylaxis or disinfection assumed considerable importance and was used in the form of two methods, namely, voluntary self-disinfection, and compulsory skilled disinfection. The first is commonly known as the "packet system" and consists in supplying the soldier with certain medicaments such as calomel ointment and a solution of potassium permanganate.

This method was adopted in the British Army, but with only moderately successful results. Being entirely voluntary, no definite statistics as to its efficacy are available. The American Army employed compulsory skilled disinfection, treatment being given at "prophylactic centers." Very successful results were obtained, but drastic measures were essential to success. Colonel Ashburn, of the Medical Corps of the United States Army, has published an exhaustive analysis of the American Expeditionary Force in regard to skilled disinfection as a prophylactic measure. After infection has occurred, the spread of these diseases in and through the Army must be prevented by early diagnosis followed by isolation of infected soldiers in hospitals at the base. Organization of treatment is an imperative requirement, and in most armies it has been found desirable to formulate a standardized treatment so that each patient will receive at least the minimum amount which will be sufficient to cure his disease. It is therefore essential to devise a routine treatment which will insure continuity and due economy of drugs. Such routine treatment may have to be modified as to its intensity and duration by the existing military situation and to secure reasonable

safety for the patients. In the British Army this treatment consisted of 9 doses of 606 and 8 doses of intramuscular injections of mercury, making a total of 3.3 grams of 606 and 8 grains of mercury.

In discussing the relation of Red Cross societies to army medical services, the speaker pointed out that national Red Cross societies in war play a most important part in cooperating with and supplementing the work of army medical services. In his opinion, in time of peace, Red Cross societies could suitably cooperate with the army medical authorities in an antivenereal campaign. A Red Cross society could organize recreation and entertainment for the troops in military cantonments and hospitals. It could assist in educational work, such as the supply of lecturers, distribution of pamphlets, organization of exhibits, and display of motion-picture films. In cooperation with the military medical authorities, it could also undertake the improvement of existing venereal hospitals. Practical experience has shown that a progressive diminution of venereal diseases may attend an improved standard of the soldiers' barracks and living conditions.

Granjux (France).

For the better protection of the young soldier against bad influences and gross temptations, Doctor Granjux, Médecin-Major de 1re classe en retraite, advocated a simple measure, proposed to the French Senate by the hygienist Strauss, and consisting of the creation of "tutor-correspondents" for the young recruits, and of family-centers for their reception when on furlough. By this system of "tutor-correspondents" is meant the application to the army of a regulation in force in French colleges, where for every schoolboy whose parents do not reside near the college, these are replaced by an official "correspondent," approved by the school authorities. The movement is not unlike the Big Brother plan which has been advantageously adopted in America for the moral uplift of neglected boys, and from the military viewpoint it is expected that these correspondents will cooperate with the army officers in maintaining a high moral standard among the young recruits. This idea has been very favorably received in France, so that the Congrès d'Hygiène Interallié asked the military authorities to extend to the families of recruits the right to propose to the chiefs of regiments a tutor-correspondent

for their sons during the period of military service. The speaker asked the congress to indorse this request, as the tutor-correspondents are certainly called upon to do their part in the antivenereal fight in the armies, by virtue of the advantages which this organization can provide from the sanitary, family, military, and social viewpoint. In reply, the congress, appreciating the potential services of tutor-correspondents along the line of antivenereal prophylaxis for the soldiers and the peace of mind of their families, besides assisting the work of the military command, expressed the urgent wish that the military authorities of all armies extend to the families the right of proposing to the regimental chiefs tutor-correspondents for their sons during the period of military service.

Glibert (Belgium). Victory in the battle which is now being waged against the venereal peril is the keynote of a contribution by Doctor Glibert, Médecin principal de 2e classe, Chef des Services d'Urologie et de Syphiligraphie à l'Hôpital Militaire de Bruxelles. He believes that in armies more than anywhere else, many steps in advance may be taken toward the desired goal.

According to Doctor Chastang, of the French Navy, who was quoted by the speaker, the wide distribution of venereal diseases in oriental countries is illustrated by statistical data of the crews, the number of venereal cases amounting to about 137 per thousand men yearly in the two divisions of Indo-China and the Far East, whereas it was only 64 per thousand in the navy of European waters and other colonial stations. In his practical experience, properly applied prophylactic measures were found to be of the greatest value, especially with regard to the prevention of syphilis. In a general way, Glibert emphasized that the three great preventive measures are represented by moral prophylaxis, which, alone, will always remain insufficient; conservative prophylaxis, which, in his opinion, is not as generally adopted as its merits warrant; and finally, curative prophylaxis against infection with the gonococcus as well as the spirochete. Conservative prophylaxis seems to be highly efficient, judging from reported results, and its systematic organization on a large scale was warmly advocated by the speaker, who expressed the hope that the relevations made to the congress from many sides would clear up this point in behalf of the vital interests of human society.

Wilmaers (Belgium).

During the war the venereal peril, as emphasized by Dr. L. Wilmaers, Médecin-Général, grew into a menace such as to necessitate the institution of a systematic and most energetic campaign against this dangerous plague in either of its forms. The total percentage of venereal contamination in the Belgian Army, from August 1, 1914, to June 30, 1918, amounted to 15.30 per cent of the average annual strength. The rapidly progressive annual percentage of venereal disease lowered and weakened the standard of health sufficiently to suggest the possibility of a reduced fighting strength in the army. The strictest possible prevention of venereal diseases in the army, in peace as well as in war time, is imperative for the protection of the individual, the community, and military efficiency. Altogether, the necessary preventive measures include: (*a*) Moral prophylaxis, which should be as educational and comprehensive as possible; (*b*) preventive prophylaxis, shown to be actually serviceable by war-taught lessons and consisting in the utilization of a personal outfit or application for skilled prophylactic treatment after every suspicious intercourse; (*c*) sterilizing and healing therapeutic prophylaxis, which means the prompt detection of venereal infections, followed by therapeutic disinfection of germ carriers and treatment of existing lesions, until the best possible cure has been obtained.

The organization of the antivenereal fight in the field must be mapped out in peace time, and requires (*a*) the creation of a divisional hospital section, in charge of a specialist in venereal diseases, and equipped with facilities for the establishment of a local service for venereal cases, in the form of consultations and temporary reception of patients; (*b*) the provision of hospital centers for venereal cases at the rear and in the interior, under the supreme direction of a medical chief of unquestioned standing as a specialist; (*c*) the individual prophylactic outfit and the functioning of preventive disinfection services must be conceded on principle; (*d*) under certain conditions incident to warfare, the venereal peril may be modified by the erection of supervised brothels behind the armies.

Stirling (Britain).

In the antivenereal campaign in the British Army, as outlined by Maj. A. D. Stirling, R. A. M. C., the chief measures adopted are as follows: (1) Frequent lectures by chaplains and others specially qualified on the moral

aspect of the subject. Provision of every form of amusement and recreation—cinemas, concerts, Young Men's Christian Association institutes with reading rooms, writing rooms, billiard rooms, outdoor sports, so that the men have plenty of healthy amusement in their leisure time. (2) Frequent lectures by medical officers to all units, which regimental officers must attend (see copy of a specimen lecture at the end of this report). (3) Frequent instruction as to the taking of adequate prophylactic measures after exposure to infection, this instruction being usually given after a lecture on the moral side. (4) Distribution of prophylactic packets to all units. These are available free at all military stations. Full instructions are given on the envelope containing prophylactic preparations, which consist of a bottle of permanganate of potash 1:1000, a tube of 33 per cent calomel cream with a pin and a pledget of cotton wool. (5) Provision of night ablution rooms, where soldiers who have incurred the risk of infection can carry out measures of self-disinfection. The following warning displayed on a poster was displayed in early treatment centers:

TO PREVENT VENEREAL DISEASE.

THE RIGHT PLAN IS TO KEEP STRAIGHT.

If you have not done so, prompt disinfection with an E. T. outfit is most important. Therefore do as follows:

I. Get an E. T. outfit, consisting of a bottle of antiseptic lotion, some cotton wool, and a small tin tube of antiseptic cream.

II. Urinate in gushes, holding the urine back by pinching the foreskin or the mouth of the pipe, and letting it go with a rush.

III. Wash thoroughly well under the foreskin with the cotton wool soaked in the antiseptic lotion.

IV. Push a pin through the nozzle of the small tin tube and squeeze half of its contents into the pipe (urethra). Squeeze the rest of the antiseptic cream over the knob of the penis, and rub it well in.

Prompt action is most important.

Never delay more than one hour.

If you have delayed for some hours, ask the M. O.'s advice about it.

[NOTE.—This poster is to be displayed only in early treatment centers.]

(6) The formation of special treatment centers, each under a specialist officer, where adequate treatment is given at the earliest possible moment when disease mani-

fests itself and the abortive treatment of gonorrhea is carried out.

SPECIMEN LECTURE TO TROOPS ON THE PREVENTION OF DISEASE USED IN THE BRITISH ARMY.

Almost every disease from which we suffer—especially in the young—is caused by microbes. Pimples and boils, skin diseases, and almost all forms of blood poisoning are due to microbes, and so is toothache. Different kinds of microbes cause colds in the head, measles, malaria, diphtheria, influenza, typhoid, plague, cholera, and the venereal diseases. There is no doubt that the trench fever from which many of you have suffered is caused by microbes.

The way to prevent illness is to prevent microbes from getting into you. To do that one must find how they travel from one person to another and stop them on the way. Some microbes live in the air passages of the sick person—in his nose, mouth, or lungs—and the sick man breathes or coughs them out into the air. That happens in measles, colds, influenza, and such like complaints, and that is why it is dangerous to go into a room where there is measles, for instance. The only way to stop such diseases as these is to isolate the sick man and disinfect his room—you can not help much here—it is the M. O.'s work.

But with some other diseases you can help a lot. The microbes of some diseases live in the stomach and bowels, generally causing diarrhea. They pass out of the sick man in his stools and may thus get into drinking water in a stream or pond, and be carried on the legs of flies to food. When there is such a disease as typhoid or dysentery about, one must be careful, therefore, that no infection reaches the food or drinking water. If one can not be sure of that one must eat only hot, cooked food and drink only boiled or disinfected water. General Maude died recently in Mesopotamia of cholera because he drank a single glass of unboiled water.

Some diseases are carried by insects. Thus typhus fever is carried by lice. The microbes live in the blood and are sucked up by the lice when they feed on the sick person; they are thus conveyed by the lice to the next person on whom they feed. You could sleep quite safely with a man suffering from typhus fever if there were no lice about. Plague is carried in much the same way by fleas, and mosquitoes carry malaria and yellow fever, so whenever there are any of these diseases about you must be careful about vermin.

But the diseases which you can most easily prevent by the use of your own common sense are what are known as the contagious diseases, so called because they are caused by actual contact with sick persons. Scabies, or "the itch," is a contagious disease and ringworm is another; but the chief of the contagious diseases are venereal—gonorrhea and syphilis. Venereal diseases are much the most terrible and prevalent of all, and yet they are the easiest to prevent, as I shall show you.

Of course the right way for you to avoid venereal diseases is not to put yourself in danger. You can not get it if you keep straight. But in every lot of men there are sure to be some who *will* put themselves in danger, and it is to them especially that I now speak. Suppose that I got some of the poison of a venereal disease on my hands, what do you think I should do? Of course I should disinfect my hands at once. The germs of venereal disease are the easiest of all to kill, and by using the disinfectant at once I should be perfectly safe. That is what you should do when you get any of the venereal poison on other parts—disinfect—and, just as I don't wait a moment before dipping my hands in the disinfectant, so should you disinfect at once.

I must tell you how a man gets the venereal poison on his private parts, because some of you may think that you need disinfect only at some times and not at others. A man contracts venereal disease by having connection with a woman who is in the habit of going with all and sundry in the same way. Not only women who do it for payment—what are known as prostitutes, but any woman with loose morals. In fact, it is those we call "amateurs" who have caused such a frightful amount of venereal disease in the British Army, and it is the same in France. I expect there are some amongst you think I am exaggerating because they have already been with such women and not got venereal disease. So they think they can insure their safety by choosing carefully. But they are wrong—and for this reason: A woman who goes with an infected man can not escape getting venereal disease. This means that almost any woman who can be "picked up" has got venereal disease because there are thousands of infected men about and it is almost a certainty that she has already been with one of them. Very often she does not know she has it and none of you could tell from looking at her that she was suffering from venereal disease; only a doctor could tell by a skilled examination that she was infected. So she goes about her work much as usual and carries on with men the same as before.

A man who goes with such a woman may easily enough escape without taking any special precautions because it is different in that way with men. The microbes are planted on the outside in his case and may easily be washed away. But you know the old saying, "The pitcher went once too often to the well," and there is nothing truer than that in the case of venereal disease. Sooner or later the man who goes with loose women without taking the precaution to disinfect himself afterwards gets caught. It may not be until the fiftieth time, but very often it is the first. There are plenty of instances where a man has contracted both gonorrhea and syphilis the very first time he went with a loose woman. Since the war began an enormous number of men in our Army have caught venereal disease. The plague grew so bad that ablution rooms were set up in barracks where men could go and wash the poison out of their pipes by irrigating themselves, and kill it on the surface by rubbing in some antiseptic ointment whenever they had been in the way of

getting venereal disease. Those ablution rooms did a great amount of good when they were properly used. They stopped a great deal of venereal but they had some faults. For one thing many men were shy about being seen going into them and did not go at all, or at any rate not until it was much too late. Others could not use them because they were on leave and not living near barracks. You must remember that time is everything in the prevention of venereal disease.

The microbes are easy enough to kill when they are still on the surface, but in both syphilis and gonorrhea they burrow very quickly, especially the syphilis germ, and once they have got below the surface of the water pipe or the skin of the penis it is the most difficult thing, taking many weeks, to turn them out. So the Army authorities have now provided antiseptics which can be used anywhere. All that a soldier has to do after exposure is to go to the medical orderly and ask for some early treatment antiseptic. No questions are asked, and he is given a small bottle of Condy, a piece of cotton wool, and a little tin tube containing some antiseptic ointment. He takes these with him to some quiet spot—a water-closet or a dark doorway, for instance—and first wipes his parts thoroughly well with the cotton wool soaked in the Condy. He should wash the mouth of his foreskin and all the little crannies round about his bridle string—or bobstay, as sailors call it—particularly well, because those parts are apt to have the skin rubbed away from them and let in the syphilis poison very easily. When he has washed in this way, he takes the tube of antiseptic ointment, sticks a pin through the nozzle end of it, and squeezes about half the antiseptic ointment out into his pipe; the rest of the ointment he rubs well into the end of his penis and again he takes great care that the mouth of his foreskin and all around the bridle string are well dosed with the ointment. All this should be done at once. Remember that the germs are trying to burrow all the time so as to get into safety, and if you give them too much start you will never catch them.

You would, no doubt, like to know how much this prevents venereal disease when it is properly carried out. A medical officer in Portsmouth was looking after 2,000 troops for about 18 months. Something like 16,000 men passed through that barracks in that time and only four cases of venereal disease occurred in the whole 16,000. That was because most of them carried out his instructions with regard to disinfecting themselves as soon as possible after exposure to infection. The four men who did get it had not used the disinfectant at all. I could tell you a number of instances like that, but here is just one other to show you the value of disinfecting early. The troopships from New Zealand used to touch at Capetown, and a lot of men were always allowed to go ashore. The result was that by the time they got to England there was always a crowd of venereal patients to send to hospital. But on one trip the medical officer got the men together before they reached Capetown and told them all about the importance of disinfecting after going with women. He told them that if they went with women and did not disinfect afterwards

many of them would be sure to get venereal disease, and advised them very strongly to come and be disinfected as soon as they got back to the ship if they had been in any sort of danger while they were ashore. They practically all took his advice, and the ship landed in England without a single case of venereal disease.

This is not told you to show you how to indulge in vice without penalty. You know that on every ship's railings there are always a number of life buoys. Of course, they are there to save the life of anyone who is fool enough to fall overboard. Everybody knows they are for that purpose, but nobody thinks they are to encourage men to jump overboard. Well, the early treatment antiseptics are like the life buoys.

One other thing you must bear in mind, and that is this. The disinfectants which are provided for your own use are no good after the disease has really started. The only hope of stopping it then is by getting skilled treatment. It is the very worst kind of folly to wait a day after the first signs of the disease have appeared, as all the time it is getting more and more into the system, and every day lost means weeks more treatment and ever so much less chance of a cure. So, even though he has used the early treatment antiseptic, a man who has been in the way of getting venereal should examine himself every morning for weeks to see if there is any discharge from his pipe or anything looks wrong about his penis. If there is the least feeling of irritation, even only a little itching or any part looks redder than it should, he should go at once to the medical officer to get advice about it. Remember that nobody can tell at that early stage whether the disease is starting or not unless he uses a microscope, but that is the time which gives the best hope of a rapid cure. The man who waits, hoping for the best, or runs off to some quack or other for a bottle of medicine or lotion is simply playing ducks and drakes with his future health and probably condemning his future wife and family to a miserable existence.

For the sake of our country we must prevent venereal disease at all costs. All the thousands of soldiers who are now suffering from venereal diseases have to be replaced by other men. That means so many more men called up, millions more money spent, and so much longer the war. After every war venereal disease spreads through the country like the plague, and wherever it goes it causes endless misery. Clean, decent, healthy young women who marry infected men get the disease and perhaps never know a day's enjoyment of health afterwards. Children inherit it from their parents and grow up cripples, insane, or blind. Think of the responsibility which lies on a man who causes all that misery, and remember that he could have prevented it if he had only avoided intercourse with women beforehand, or if he had only taken the precaution to disinfect himself at once whenever he had indulged.

You must remember the history of all this. Four hundred years ago there was a condition of war in Europe much the same as at the present day. The armies marched all over Europe, and when the war was over the soldiers went home. Then two great plagues which had been spread by the soldiers ravaged all

the countries. One was smallpox, which killed millions. The other was more awful and invaded every home, striking down prince and peasant. It was called "great pox," and it was the same disease we call syphilis or "the pox" to-day. Something like that happens after every war, and the bigger the war the more likely the country is to be infested with these horrible diseases. This is the biggest war that has ever been, as you know, and unless we take precautions the venereal plague will be worse after it than it has even been before. We don't want the homes of England ravaged by these diseases after the war, and now that we know how to prevent them it is up to everyone to do his best to keep venereal disease out.

Now, that is all I want to say. I have talked to you as decent, reasonable men. I have appealed to your common sense. You know as well as I do how venereal disease is caught, and know what a terrible thing it is, and you know how it is prevented. I don't want you to be immoral, but if you *will* incur danger of disease you must not come back here in a filthy state, bringing disease into the barrack room. For the sake of your comrades, to say the least—for the sake of your country, your future wives and families, for the sake of almost everything which makes life worth living, you must disinfect yourselves.

Lakaye (Belgium).

The excellent results of the prophylactic stations in the American Army were extolled in the report by Dr. R. Lakaye, Médecin de Bataillon de 1re Classe, de Réserve. He pointed out that the medical officer is the keystone of the entire antivenereal prophylaxis in the Army. It is he who is charged with the duty of instructing, preventing, curing, and investigating. This task, in order to accomplish its object, requires not only a high competence and considerable work, but an unceasing zeal and devotion to this truly humanitarian service. It is certainly necessary to give detailed instructions to physicians concerning their part in the great antivenereal fight, but they must also be left the greatest possible freedom of action, for success will depend not so much on the more or less strict adherence to the various rulings, but rather on the efforts and especially the willing cooperation of all concerned.

Sacquépée (France).

The Prophylaxis of Venereal Disease in the French Army in Peace Time was the subject of an address to the congress by Dr. E. Sacquépée, Médecin Principal de 1re Classe, Professeur á l'Ecole d'Application du Service de Santé Militaire, who emphasized that although the war was a victorious one, more formidable enemies still remain to be overthrown, in the form of alcoholism, tuberculosis, and venereal diseases. Statistics for France have shown that syphillis in 10 years has cost more victims

than the war. Prophylactic antivenereal measures in use in the French Army were successively discussed by the speaker, under the headings of educational measures, sanitary measures aiming at the protection of healthy individuals, and therapeutic measures in behalf of infected men. Stress was laid on the curability of syphilis, when properly treated, and on the gravity of gonorrhea, which is often erroneously considered as a harmless disease, but which from its onset requires careful treatment under medical supervision.

Antivenereal prophylaxis in the Swedish Army.

In the form of an extract from Circular No. 432 (1920) of the medical director of the army administration, Sweden submitted to the congress sanitary rulings in regard to the prophylactic treatment against contagious venereal diseases. A circular containing these rules was first issued on December 31, 1919. Personal prophylactic treatment is referred to as one of the most efficient measures against the propagation of contagious venereal diseases. In all army corps where medical officers are on duty, measures must be taken for the application of preventive treatment against contagious venereal diseases, in conformity with the special orders of medical chiefs and with certain army regulations. Medical officers are expected to make suggestions as to what is needed for the facilitation of treatment, to give all the hospital attendants in their service the necessary instruction for the application of the treatment, and to superintend the proper performance of the treatment.

Kensa Oyama (Japan).

Some effective precautionary measures, adopted by the Japanese Army, for the prophylaxis of venereal diseases, were mentioned by Surg. Lieut. Col. Kensa Oyama, as follows: Hygienic and moral lectures, given by medical officers or others, to teach the soldier the evils of venereal disease and the necessity of self-control; improved conditions of military life, with provision of some home comforts; attempt at extermination of unlicensed prostitutes, in cooperation with the local authorities; accurate instruction, in popular intelligible terms, concerning the evil of venereal diseases, the modes of infection, and prophylactic measures, by means of wall maps, cinematographic views, photographs, models, and other adjuvants; recommendation of precautionary measures in the form of local application of disinfectant ointment after every illicit intercourse. The incidence of venereal diseases in the Japanese Army during the past 40 years

shows a most gratifying gradual decrease, the rate of venereal disease among the soldiers having dropped to one-eighth of the figure noted in 1877. This slow but steady decrease was attributed by the speaker to the gradual improvement of social sanitation, the progress of medicine as well as personal hygiene, and systematic educational training in the army.

Carruccio (Italy).

A summary of the method and measures adopted for the prophylaxis and treatment of venereal diseases in the Italian Army during the World War formed the contribution to the congress by Lieut. Col. Prof. M. Carruccio. The three goals pointed out by him as forming the basis of the sanitary organization against venereal diseases in the army are social and individual prophylaxis, prompt and efficient treatment of infected men, their best and earliest restoration to health. The institution of "personal cards" for syphilitics was found to be a very useful measure, these cards stating the name and paternity of the patient, the date of infection, its principal symptoms, and the treatment to which the soldier was subjected during his military service. A supplementary card contained the most important hygienic rules as well as earnest advice to the patient to avoid possible contagion of members of his family and to continue his specific treatment. In his capacity as director of the First Municipal Dispensary in Rome, which is frequented every day by large numbers of civilian and military patients, he often had occasion to observe that syphilitic patients, still in uniform, or soon after their discharge, presented themselves for treatment with this card, which accordingly served its purpose in a number of the cases.

Other prophylactic measures in use in the Italian Army consisted in the erection in the fighting zone of houses of prostitution reserved for soldiers, carefully supervised by medical officers and equipped with all known measures for individual disinfection; periodical addresses to the regiments; sanitary visits; extensive distribution of hygienic propaganda pamphlets among the soldiers; finally, the provision of a special station in all military infirmaries where the soldier on his return from a suspicious intercourse could, with the assistance of a trained attendant, carry out the necessary disinfection measures for the removal or diminution of the risk of contagion. In the speaker's opinion, the most important and efficient of all these prophylactic measures was the

establishment of houses of prostitution reserved for soldiers and supervised by a specialist medical officer; and if it were possible to create and reliably operate such houses also in peace time and in the organization of civilian prophylaxis this would mean a great step in advance in the social defense against venereal diseases.

The prophylaxis against venereal diseases in Albania and Macedonia demanded still greater efforts, on account of the prevailing very bad hygienic conditions in regard to contagious diseases in general and venereal diseases in particular. According to the synthetic report on the work of the sanitary commission of the allied countries, all the other nations except Italy agreed to adopt during the war the most severe methods of suppression against prostitution and to enforce the strictest measures in cases of venereal contagion among soldiers. Carruccio laid stress on the fact that nothing of the kind was considered necessary in Italy, where soldiers were carefully instructed in regard to personal prophylaxis and patients suffering from venereal diseases were managed as any other patient, the military officers thereby accomplishing a wise and humanitarian task. Directed by the spirit of modern progress, conducted by reliable and efficient means, fought with commendable zeal by the medical officers intrusted with this work—the fight against venereal diseases is claimed to have so far produced all the good results obtainable in view of the gravity and manifold difficulties of the complicated physical and moral problem of social defense against this evil.

Pochon (Switzerland).

Doctor Pochon, Médecin-major de l'Armée Suisse, reports on the treatment of venereal diseases in the Swiss Army, under the conditions as they existed during the World War. Based upon his experiences in the Sanitary Institute in Soleure, he considers it as dangerous to group together all the venereal patients of the army (especially men with recurrent infections, and those who count on their disease to remain inactive) in a sanitary institute instead of sharing in the work of the troop. These less desirable elements must be removed and cared for in small groups, so as not to contaminate too many men from the moral viewpoint. Centers of antivenereal treatment should be established which the soldiers can visit without being too long away from their troop. Strict measures must also be taken against men

who allow their disease to go on indefinitely or who reacquire it directly on their return to military service. Finally, and especially, the antivenereal fight must be organized in the civilian population, imparting knowledge, placing within reach of everybody without obligation and as far as possible without expense, antivenereal treatment by competent specialists. This will prove the best weapon against this evil, and the number of venereal patients in the army is thus certain to be diminished.

Ten Hove (Holland).

Lieutenant Colonel Ten Hove pointed out that the problem of the fight against venereal diseases in the army lost much of its urgent character after the return home of the demobilized soldiers. Holland was mobilized almost throughout the entire war in order to prevent breach of neutrality, to guard against any unexpected eventualities, and to take care of interned troops. At the time of this report the antivenereal fight in the Dutch Army had practically ceased to exist. In May, 1920, the number of venereal patients treated in the military hospitals did not exceed the figure of 2.5 per thousand of the sum total of the army, and in May of 1921 this number had diminished to 1.6 per thousand. The professional chiefs of the medical service in the garrisons are charged with the duty of taking all necessary steps in the case of an increased number of these patients (unannounced medical visits, lectures held in the barracks by a sanitary officer, and similar procedures). The diminution in the number of venereal patients in the Dutch Army may be attributed to two principal causes—progressive diminution in the number of enlisted soldiers, and the measure of permitting soldiers, as a favor, to sleep at home, in the houses of their parents or guardians.

Van der Smissen (Belgium).

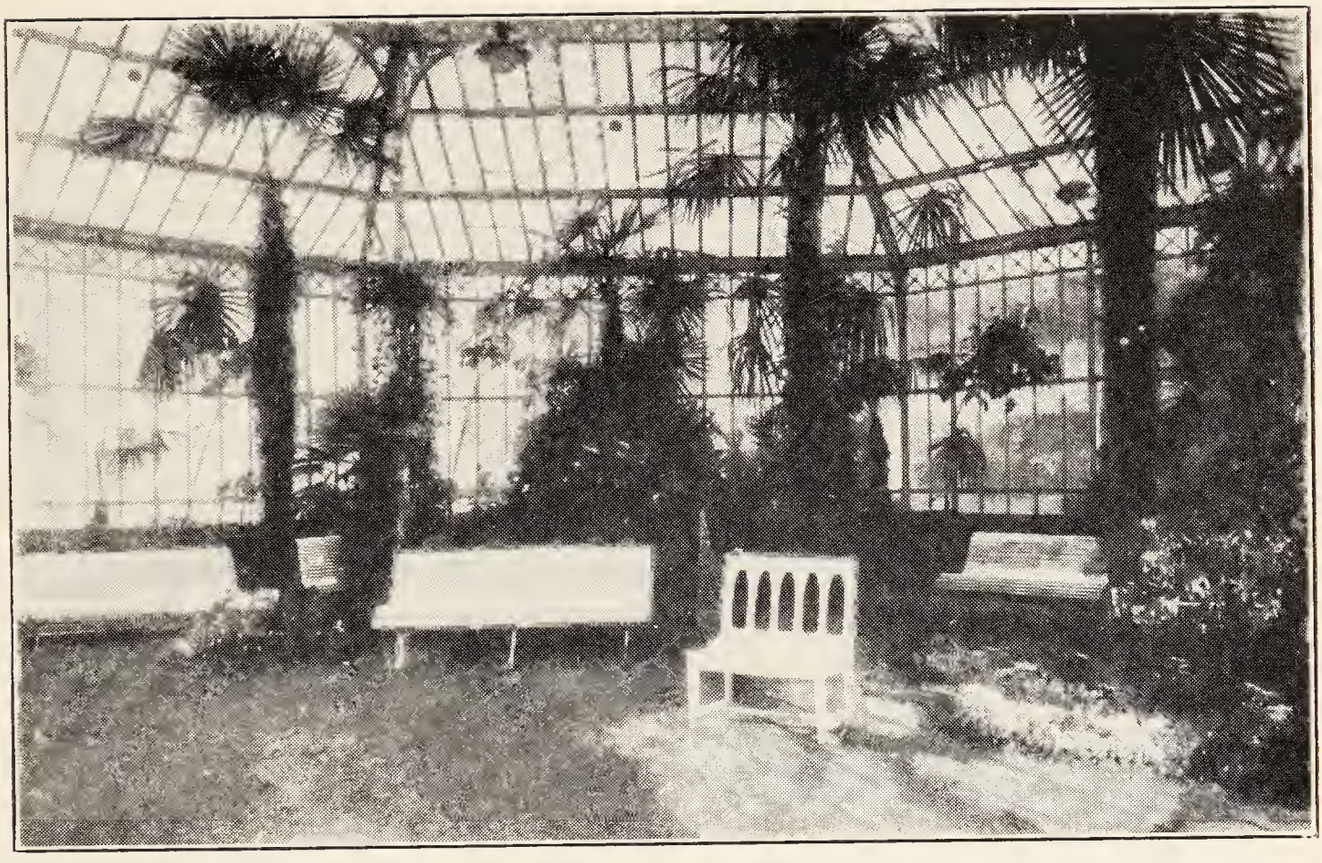
A practical preventive measure against venereal diseases, more particularly gonorrhea, was proposed by Doctor Van der Smissen, médecin principal de 1re classe, in the form of a polyvalent product of calomel and sodium taurocholate, for local application as an ointment. The bacteriologic action of sodium taurocholate is not antiseptic, but bacteriolytic, for the drug may be said to dissolve the gonococcus. This preventive treatment is easily applied, entirely painless, and so promising of good results that its originator hopes for its introduction not only in the Belgian Army, but in all armies.

Nyssens (Belgium).

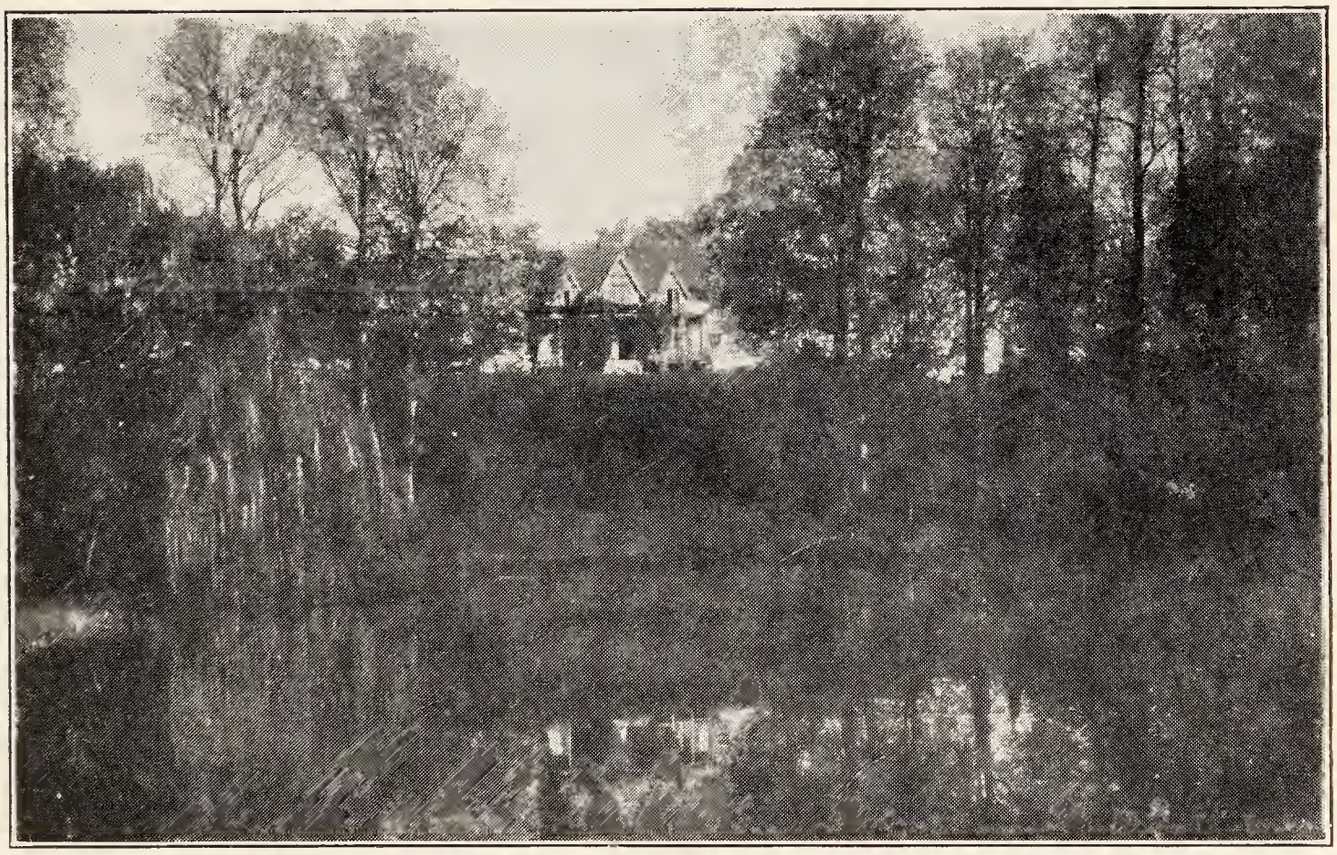
Doctor Nyssens invited the attention of the congress especially to the subject of *individual prophylaxis*. He laid stress on the negative results accomplished by the delivery of periodical lectures and addresses to the newly enlisted men. In view of the inefficiency of these lectures, and the recrudescence of venereal affections, chiefly at the time of and following the armistice, the speaker, while at the head of the venereological service in the Antwerp Military Hospital, adopted the system of illustrated lectures, intentionally making use of somewhat sensational, startling, and impressive pictures. He is forced to admit, however, that the percentage of new cases remained the same before as well as after the illustrated lectures, which were each time attended by several hundreds of soldiers. Briefly stated, lectures to the soldiers with or without projections had identical and absolutely negative results. This is not the case as regards individual prophylaxis, such as is practiced in the American Army or enforced in the German Army. The results of the American system have been highly encouraging, as the speaker was enabled to convince himself, the chiefs of the venereological services having succeeded in almost entirely eradicting venereal diseases among the soldiers. Penalties are inflicted on men found to have a venereal disease, not because the soldier has had the misfortune to become infected, but because he has neglected to follow the prophylactic prescriptions at his disposal. While satisfactory results may be anticipated from the regulation of public prostitution and from the strict control of secret prostitution, simple rules of *individual* prophylaxis are likely to yield more efficient results, the benefit to the men increasing at the rate of the simplicity of application of these measures.

Declairfayt (Belgium).

In his venereological service at the front Doctor Declairfayt was strongly impressed on noting the disastrous influences of furloughs and leaves of absence on the recrudescence of venereal diseases. The urgent need for making clear to the soldier the appalling consequences of debauch and fornication led to the preparation of a booklet (pocket edition, 130 pp.), entitled Les Durs Réveils (The Sad Awakening), which was published in Brussels in November, 1920, the work of a qualified friend of the speaker, who submitted it to the members of the congress with the proposal of its gratuitous distribution through the army, among the young recruits,

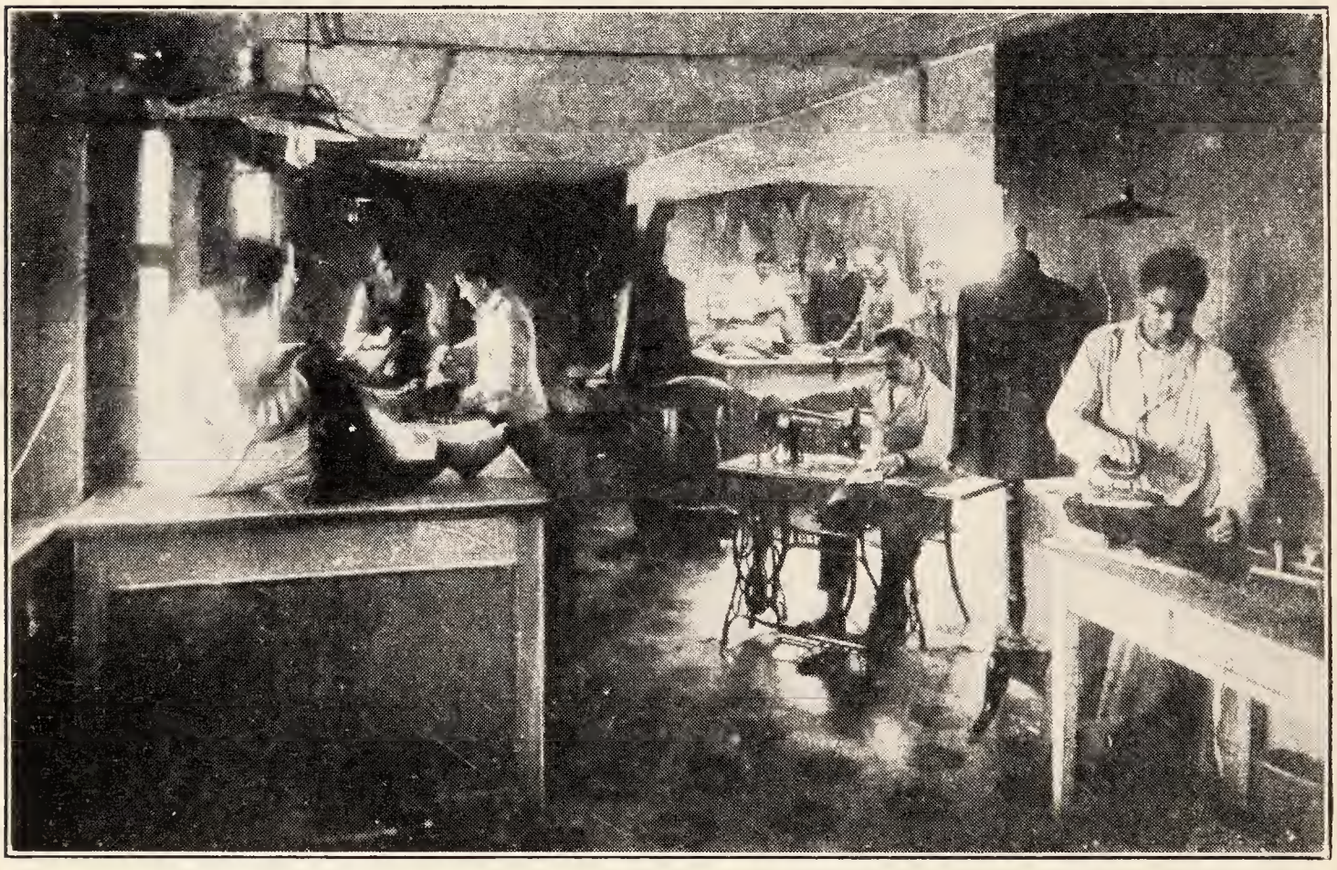


WOLUWÉ. THE WINTER GARDEN AT THE HOSPITAL FOR CRIPPLED SOLDIERS.



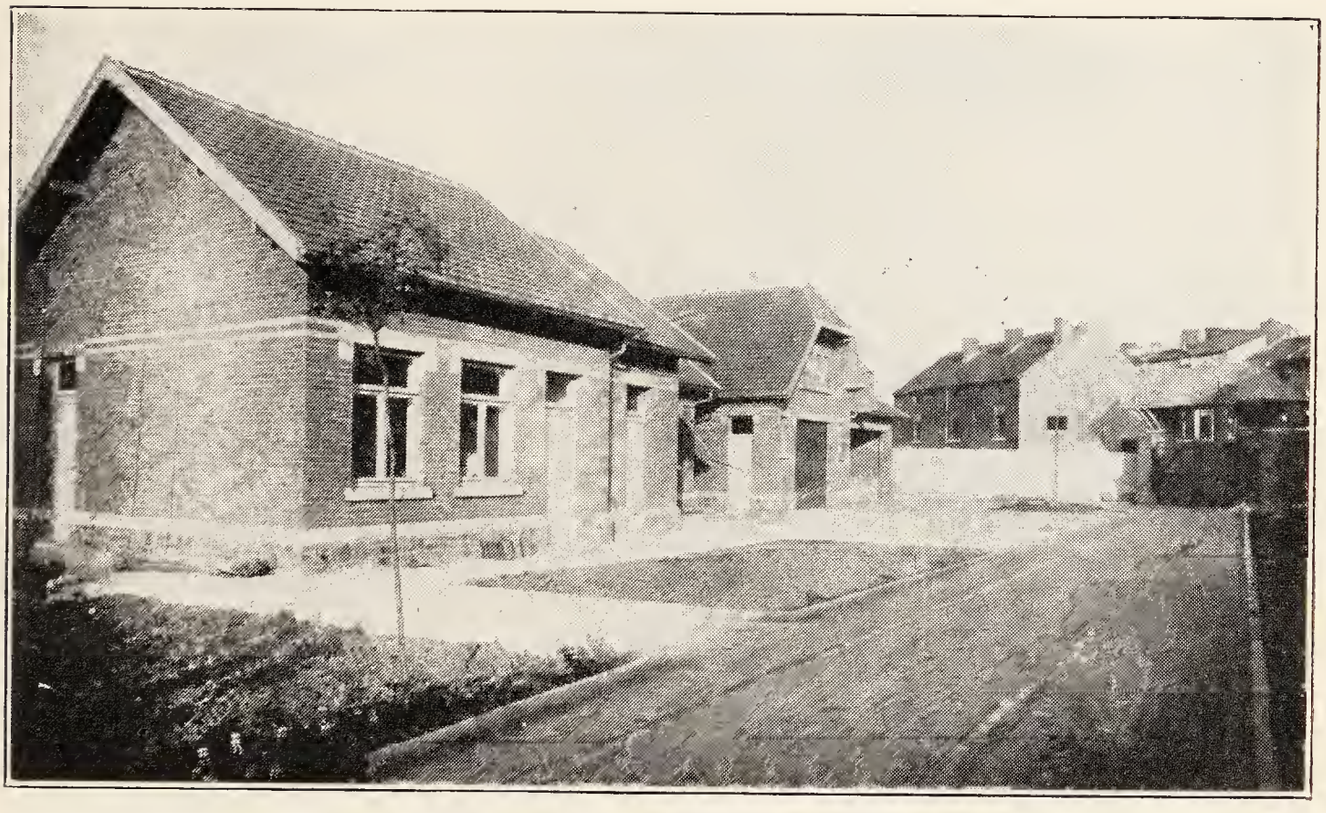
IN THE GROUNDS OF THE REEDUCATION HOSPITAL FOR CRIPPLED SOLDIERS AT WOLUWÉ.

WOLUWÉ. A WORKSHOP IN THE HOSPITAL FOR WAR CRIPPLES.



PRACTICAL WORK IN THE REEDUCATIONAL SCHOOL FOR CRIPPLED SOLDIERS AT WOLUWÉ.

INDUSTRIAL HOSPITAL AT SERAING, BELGIUM.



SERAING. A PORTION OF THE INDUSTRIAL HOSPITAL.

SERAING. THE INDUSTRIAL HOSPITAL WHICH IS PERFORMING A REMARKABLE WORK IN CARING FOR THE INDUSTRIAL ACCIDENT CASES OF SERAING AND THE NEAR-BY CITIES.

THE SANITARIUM DE BORGOUMONT FOR THE TREATMENT OF TUBERCULOSIS; NEAR SPA.

where it would undoubtedly render the best prophylactic services.

De Block (Belgium).

Objections against this booklet—written by Hoornaert, not a physician, and dedicated to the young recruits of the Belgian Army—were raised by Commandant De Block, who pointed out that the army should never be designated as the hotbed of the syphilitic evil. It is urgently desirable that the public services of the civilian community take up this problem with the same zeal as shown by the military authorities, for nothing is gained by delivering lectures and taking other similar measures if the disinfected soldier recontaminates himself with public and private prostitutes, who have been insufficiently recognized and treated in civilian life. The speaker suggested the formulation of a request in the following terms: The Congrès International de Médecine et de Pharmacie Militaires, considering that the extinction of venereal diseases is scientifically and strictly practicable in the military medium by means of disciplinary, preventive, and curative measures, expresses the desire that the civilian authorities in their turn engage with energy in the antivenereal crusade in the civilian community in order that the soldier may be less and less exposed to the contamination which threatens him outside of the barracks. Furthermore, in view of the perils of dangerous sexual intercourse of enlisted youths, the congress expresses the desire that initiation in these matters should be provided in the upper classes of high schools and other institutions so as not to send totally inexperienced young men to the army, who may unwittingly expose themselves to the danger of venereal contamination, even before their entrance into military service.

Wilmaers (Belgium).

General Wilmaers, in discussion, spoke eloquently of the venereal peril, and the necessity of utilizing all possible means in the fight against this evil. The antivenereal fight in the field in time of war should be organized in advance, during peace time. The attention of the congress was drawn to the statistical data in the speaker's report, which show the extent of the venereal evil in the course of the war—18,755 venereal cases were seen in the divisional infirmaries from August 1, 1914, to June 30, 1918, in an average annual force of 122,449, not including the officers, about 4,000 in number (15.3 per cent). It is estimated that at the rear, where the danger

of contamination was permanent, the number of venereal cases was likewise considerable, probably not far removed from 10,000 to 15,000. After the armistice the hospitals remained packed with venereal patients, and on March 5, 1919, at a time when demobilization was already far advanced, among 3,210 hospitals inmates in different sanitary formations, there still remained 702 venereal cases, or 21.83 per cent. As an example, showing that after the war venereal evil is still prevalent, the speaker pointed out that in the garrison of Antwerp alone, with an average force of 11,000 men, the hospital of this garrison received a monthly average of 21 per thousand of syphilitics and 27 per thousand of gonorrheal cases. To this number it is, of course, necessary to add a more or less considerable number of venereal patients cared for outside of the hospital.

The antivenereal fight must be strenuously waged, and all that *can* be done *must* be done. No tangible results have so far been accomplished by means of moral or educational measures, lectures, tracts, healthy recreations, and related methods. In Belgium the Government has everywhere opened its dispensaries and physicians have been authorized to prescribe all the necessary medicinal agents at the expense of the State, thereby encouraging therapeutic sterilizing prophylaxis. As a result, large numbers of venereal cases have come under treatment, and many syphilitics have been "purified." But this is not enough, especially as gonorrhea with its far-reaching consequences is very difficult to eradicate. Preservative individual prophylaxis must be still more urgently recommended and popularized. The prophylactic dispensaries, created during the war in certain allied armies, have been tried and tested, their brilliant statistical results suggesting a well-nigh absolute efficiency of preservative sterilization. This is undoubtedly exaggerated, but even if the percentage of sterilization amounted to no more than 80, 70, or even 50 per cent, the method would still remain imperative. With special reference to the Belgian medical service, the speaker stated that in October, 1920, the technical committee of this service transmitted to the department of national defense a complete program of antivenereal prophylaxis, comprising individual prophylaxis and the establishment of prophylactic treatment rooms in the barracks. The realization

of this project, as emphasized by the speaker, still called for a formal declaration of the congress, conferring the necessary authority for the institution of needed measures along these lines.

Sieur (France).

The general agreement from all viewpoints on the matter of individual prophylaxis was conceded by Inspector-General Sieur, but he pointed out that the moral difficulties must not be lost sight of. Referring to the individual procedure described by Van der Smissen, the speaker mentioned an individual procedure of his own, but he is waiting for the solution of moral difficulties before adopting this procedure as well as a series of individual remedies. He is convinced, however, that a satisfactory solution will be reached.

Tant (Belgium).

Doctor Tant gave information concerning the number of venereal cases in the army in the field and supplemented the statistics given by General Wilmaers. Since September, 1918 to August, 1919, the time of demobilizations, in an average force of 151,000 men, reports were received of 5,576 new cases of venereal diseases (1,079 syphilitic, 4,086 gonorrhea, 411 soft chancres). Taking into consideration the date of demobilization, this figure must be regarded as very incompletely indicating the sum total of venereal infections, for the data of two months are lacking, equalling 24,331 cases for an average force of 136,000 men. The antivenereal fight at the front has often been led under difficult conditions during the war, and it is desirable to provide now for an improved organization. The speaker described the organization in wartime of a divisional antivenereal service, permitting patients to receive without difficulty the care of a specialist, and to follow a rational treatment. He urged that all men suffering from gonorrhea in its acute stage, and all syphilitics with contagious lesions, especially of the mouth, be removed from their unit, and energetically treated in an antivenereal center.

POISON GAS IN WARFARE.

An important subject considered by the congress was the recent and far-reaching problem of poisonous gases as modern weapons of warfare, including their remote and permanent effects on the organism, as well as the bearing of war-gas poisoning on disablement and earning capacity. A number of valuable papers were pre-

sented for consideration by distinguished authors from England, Belgium, Czechoslovakia, Italy, and France. Anticipating the more detailed summaries of these contributions, which will be found farther on, a prominent place must be given to the statement that for the treatment of so-called "gassed soldiers," special sanitary formations in the army medical services, in the form of mobile units, located near the front, were approved of by the congress. Acute war-gas poisoning is to be treated in these sanitary formations by competent physicians who have made a special study of this condition and are entirely familiar with the handling of these patients. The diagnosis tags of all gassed soldiers are to be marked with a plainly visible sign, to be fixed in its place after the diagnosis of gas-intoxication has been confirmed in a specially equipped hospital.

War-gas poisoning was declared to be very rarely followed by pulmonary tuberculosis, as a direct sequel of the injurious effects of these gases. The condition, on the other hand, in severe cases, is likely to induce permanent, more or less complete, disablement, as a result of irregular and hurried heart action, so-called "irritable heart;" chronic respiratory disturbances, in the form of asthma or emphysema, through pulmonary adhesions; total or partial loss of teeth, with many harmful sequelæ; neurasthenia and other nervous affections of various kinds; impaired vision and other ocular disturbances, rare but grave remote results of war-gas poisoning. The disability percentage of gassed soldiers is further modified by the fatigue effect of chronic respiratory disturbances—such as inflammatory or fibrous changes of the bronchioles, or pulmonary emphysema—upon the heart. There is also reason to assume a diminished resistance of the lung against subsequent acute pulmonary infections in individuals who have been exposed to severe intoxication through poisonous war gases. In gas-poisoning of the usual degree, however, and in soldiers who have not been obliged to pass a long time after the attack in the hospital, there is practically no danger of permanent lesions as the aftermath of war-gas intoxication.

Stirling (Britain). In his clinical and therapeutic study of war gases, used during the war by the Central Empires the contribution of Maj. A. D. Stirling, R. A. M. C., who also investigated the sequelæ of the action of these gases on the organism

and their influence on invalidism, the speaker, on the basis of a report by Meakins and Priestley on 700 cases of gas poisoning, finds that the remote complications of chlorine poisoning are practically limited to the manifestation of the syndrome "irritable heart." Bronchitis was noted in only 5 per cent of the cases. Symptoms on the part of the stomach or the kidneys were extremely rare. It is especially noteworthy that the incidence of tuberculosis in these cases is negligible, although conditions such as have been described as pseudo-tuberculosis after gas poisoning by French observers, with symptoms of profuse expectoration, low fever, and loss of weight, were occasionally noted in protracted cases. The after effects of chlorine gas were fortunately not so serious as had been originally feared. Stirling's statistics prove that the most severe cases may recover and be fit for duty again in four to six months. According to figures of the ministry of pensions, gas poisoning accounts for 2 per cent of all disabilities among pensioners, and the number of pensioners in which gas poisoning is the principal disability is approximately 20,000. The avereage degree of disablement amounts to 18.5 per cent.

Frédéricq (Belgium).

The exhaustive report of Henri Frédéricq, Professeur à la Faculté de Médecine de Gand, Médecin de Bon de 1re Classe de réserve, Ancien chef du service des intoxications par gaz à l'Ambulance de l'Océan (section de Vinckem), comprises a study of the physiological action of the gases used in warfare, the acute clinical manifestations of gas poisoning, and the therapeutic measures adopted for their control; the sequelæ of war-gas intoxication and their treatment; finally, a brief discussion of incurable lesions from gas poisoning and the invalidity percentage. The severe acute symptoms are produced in conformity with the dominant properties of the different groups of gases used by the Central Powers, in the form of hypertoxic substances, represented by hydrocyanic acid and carbon monoxide; suffocating gases, such as chlorine, phosgene and others; vesicants or blistering gases, notably dichlorethyl sulphate, better known as mustard gas, or as yperite, because it was employed for the first time by the Germans against the British front at Ypres, in July, 1917; lacrymogenic or tear-producing substances, usually fluids with a high boiling point, which are used exclusively with artillery projectiles; sternutatory gases with the same action as

vesicant gases, and in addition causing frequent sneezing attacks. The disturbances caused by suffocating gases consist of reflex heart failure, asphyxiation, pulmonary edema, pneumonia, pulmonary gangrene, and digestive disturbances. Vesicant gases act primarily on the eyes, causing acute conjunctivitis (followed by secondary purulent changes), with swelling of the eyelids, chemosis, acute congestion of the anterior ocular structures. Serious lesions of the cornea are rare. These gases also give rise to cutaneous burns of the first, second, or even third degree, as well as severe inflammation of the larynx and trachea, followed by secondary and often fatal broncho-pneumonia.

The treatment of acute pulmonary edema from war-gas poisoning includes venesection, systematic inhalation of oxygen, absolute rest, application of heat to the gassed body, administration of ipecac, heart stimulants, antiseptic agents for the respiratory passages, prophylactic measures against pneumonia. Disinfection of the eyes aims at the prevention of conjunctivitis. Burns of the skin require adequate local applications. In the treatment of broncho-pneumonia heart tonics and antiseptic agents are called for. Chronic bronchitis, pulmonary emphysema with attacks closely resembling asthma, cicatricial adhesions of healed pulmonary abscesses, symptoms of so-called pseudotuberculosis on the part of the lungs and the body as a whole, irritable heart and tachycardia, chronic conjunctivitis, and injurious adhesions constitute the principal sequelæ of war-gas poisoning. For the treatment of these conditions breathing exercises and suitable gymnastics are recommended, with antisepsis of the respiratory apparatus, and judicious addition of oxygen to the air breathed by the patient. In estimating the percentage degree of disablement the primary consideration is the degree of functional impairment experienced by the patient, as well as the condition of his heart. At the same time, it is advisable to take into account the liability of gassed soldiers to contract intercurrent diseases, their onset being favored by the diminished resistance of the heart and lungs after recovery from war-gas poisoning.

Denhaene (Belgium). An unexpectedly cheerful note is struck by the observation that as compared to the damage done by war gases to the respiratory apparatus, the *eyes* have escaped with relatively very mild injuries through these agents.

Doctor Denhaene, Médecin principal de 1re classe, presented a most instructive paper on the ocular lesions caused by these gases and the bearing of their sequelæ on pensioning for disablement. Corneal opacites of a mild type are the only result of war-gas poisoning, and the occurrence of these opacities is by no means common, according to the majority of authors. The severity of the general phenomena which accompanied the ocular lesion must be taken into account in the verification of damage claims; for a very extensive or very thick corneal opacity can only be the result of a very deep corneal ulceration, a complication which is always associated with severe gas poisoning, followed by prolonged stay in the hospital so that it can be controlled by means of hospital records. Although the possibility of incurable lesions of the choroid and retina can not be altogether denied, it must be kept in mind that according to all observers, the action of the vesicating gases upon the anterior segment of the eye is limited to a venous congestion of the deep membranes, a condition met with only in the presence of severe gas poisoning of the entire organism. Simple blepharitis and conjunctivitis, following upon exposure to poisonous gases, is amenable to more or less prolonged appropriate treatment, and therefore can not figure in a percentage disablement claim.

Sterckmans (Belgium).

The sequelæ of the action of war gases from the oto-rhino-laryngological viewpoint formed the subject of a brief but instructive paper, presented by Dr. C. Sterckmans, Médecin de Bon de 1re classe, who in the course of three years observed 34 cases, most of which were due to yperite. Such sequelæ are rare and usually accompany other more distressing lesions; they have received practically no attention in the literature. Persistent aural disturbances may occur in the form of acute middle-ear suppuration or chronic catarrh of the Eustachian tube. Contraction, adhesions, and chronic inflammatory conditions have been noted in the nose and the accessory nasal sinuses. By far the most common manifestation on the part of the oto-rhino-laryngological apparatus is chronic laryngitis. All gassed soldiers, irrespective of the composition of the responsible gas, reach the ambulance or the hospital with a hoarse or husky voice, difficult respiration, a constant dry, distressing cough; the larynx being the seat of more or less marked acute inflam-

mation. The constant irritation of the laryngeal mucosa through the atmospheric dust drawn in by the widely open mouth, due to involvement of the nose; its low vitality; its scanty blood supply; its local delicacy; and especially the innumerable folds of the laryngeal mucosa, favor the persistence of inflammatory changes, and account for the great frequency of chronic laryngitis following the inhalation of war gases.

Zrunek (Czechoslovakia).

In a general way, the same asphyxiating gases were employed by the Allies as by the Central Powers. Dr. C. Zrunek, Commandant-Médecin of the Czechoslovakian Army, in an elaborate address delivered before the congress on gas intoxication during the war, pointed out that the term "gas" is customarily employed, although these products are for the most part liquid at ordinary temperature, their boiling point lying above 100° Cel. Even substances which are solid at ordinary temperature, such as diphenylchlorarsin, are usually grouped under the heading of war gases. As a matter of fact, such products are highly volatile and through the explosion are scattered in the form of very small drops, with the result that their evaporating surface is enormously increased, evaporation is greatly facilitated, and their behavior toward living bodies becomes that of a gas. From the practical viewpoint, moreover, it is sometimes immaterial if their influence is exerted in the form of a gas or as a fine fog. Hence, as the conception of a gas from the technical, fighting viewpoint does not coincide with the physical character of gaseous substances, the name of asphyxiating gases should be improved upon in medical terminology, for example by the term "War intoxicants" (toxiques de combat). Aside from poisoning through actual war intoxicants, there are other intoxications due to the liberation of gases, especially carbon monoxide, in the combustion of explosives.

Although the concentration of carbon monoxide does not become dangerous in the open air, on account of its rapid diffusion, circumstances differ in inclosed spaces, such as trenches or dugouts. With special reference to war intoxicants proper, the action of these gases, with the exception of cyanogen and yperite, is based upon acid corrosion, promptly leading to death through arrest of the function of the epithelium of the respiratory passages, or proving ultimately fatal through pulmonary

edema complicated by severe circulatory disturbances. Death may follow later on, after secondary infection has occurred, as the result of pneumonia or pulmonary gangrene. Therapeutic measures in these cases consist of oxygen inhalation and venesection, as the most important procedures for the control of the existing disturbances. The derivatives of cyanogen act through absorption and kill as the result of paralysis of the central nervous system, especially paralysis of the respiratory center. Treatment in these circumstances consists of artificial respiration and inhalation of oxygen. Yperite causes, in addition, a bullar inflammation and necrosis of the epidermis, inflammation and ulceration of the conjunctiva and cornea, diphtheroid inflammation of the respiratory passages, and pulmonary edema. The fact of having been "gassed" undoubtedly diminishes the resistance of the organism against subsequent intoxications. However, permanent disablement due to the action of asphyxiating gases is very uncommon.

Businco (Italy).

So-called asphyxiating gases were discussed by Dr. Armando Businco, Tenente Medico di Complemento, and are summarized in their most important features, as follows: The anatomoclinical effects of gaseous substances used in warfare correspond relatively rather than absolutely to the causative agent, so that substances belonging to one group may exhibit the properties of another. It is possible in animal experimentation to reproduce conditions similar to those observed in human beings as the result of these emanations. A careful histological examination is required in order to ascertain (*a*) that the anatomical picture is due to the action of deleterious powders or vapors; (*b*) that this picture differs from the ordinary circulatory disturbances of the respiratory organs (hyperemia, edema from other causes), from acute inflammatory phenomena (pneumonia, bronchopneumonia), from primary asphyxias (suffocation, etc.), all of which present similar microscopical findings. One of the most important histopathological signs, showing that a poisonous gas has been inhaled, is represented by respiratory histoeosinophilia. It is difficult, if not impossible, to specifiy the causative toxic agent by means of histological examination, but through careful research a reliable opinion can be reached as to one group of poisons being responsible rather than another. From

this viewpoint—restricting this statement to personally or recently studied substances—the Italian author distinguishes between the following groups: (*a*) Group of poisons with a hemolytic-edema-producing action (hydrocyanic acid) and a congestive-edema-producing action (chlorin-bromin); (*b*) group of poisons with a congestive-desquamative-exudative action (phosgene, chloropicrin, acrolin); (*c*) group of poisons having a slower, emphysema-producing action (fuming sulfuric acid, etc.). These groups are not to be considered as rigid or permanent divisions. In order to arrive at a positive conclusion as to the specific agent, chemical tests (extraction of the poison) or histochemical examinations are required in all cases.

The respiratory organs experience these injurious influences to the highest degree. The principal effects may be distinguished as (*a*) acute manifestations (syndrome of asphyxia, hemoptysis, emphysema, edema); (*b*) subacute symptoms (sequelæ of the preceding phenomena); (*c*) chronic conditions (establishment of sclerotic lesions, leading to progressive reduction of the respiratory exchanges, with all its harmful results); (*d*) complications (pneumonia, broncho-pneumonia, etc.) for which the "gassing" constitutes the predisposing factor. The predominating phenomena of asphyxia are eminently due to the serious damage and sudden desquamation of the respiratory mucosa in all its tracts, but especially at the level of the bronchial ducts and smallest bronchioles. The edema participates in the production of the asphyctic phenomena, but does not constitute its only or predominant cause. The anatomical findings permit a more realistic interpretation of the gravest syndromes of the acute stage, as well as the phenomena of the resulting chronic obliteration of the respiratory passages. *Anatomically*, these cases may be divided according to the level of the obliteration, into (*a*) obliterative fibrous bronchiolitis, when the chronic process affects the respiratory bronchioles, or the smallest bronchi; (*b*) obliterative fibrous pneumo-alveolitis, when the process takes place essentially at the expense of the respiratory parenchyma; (*c*) obstructive fibrous bronchitis, when chronic productive processes become established in the bronchial passages with a large lumen. *Clinically*, these various localizations give rise to an identical symptom complex.

Other systems of the body, besides the respiratory apparatus, also participate in the clinical picture of war gas poisoning: First in order of frequency and gravity rank the digestive organs, the cardiovascular system, the nervous system, the internally secreting glands. Sometimes the affections of these systems predominate in the symptomatology, manifesting themselves as a disease which overshadows the respiratory disturbances. The behavior of the thyroid gland is especially noteworthy in this connection. At the present state of our knowledge, it may be asserted that although the changes caused by inhalation of poisonous gases can not be regarded as a pathognomonic sign of asphyxia, these changes nevertheless possess an undeniable medico-legal importance in doubtful cases, and should always be looked for. Taken in conjunction with the respiratory histoeosinophilia, they may constitute positive evidence as to the cause of death.

The Italian contribution, in conclusion, emphasizes the fact that the study of "gassing" has thrown a valuable light on occupational pathology, because aside from explaining the origin of the acute and chronic disturbances of the respiratory organs, which previously were not entirely understood, a more accurate and sympathetic estimate can now be made, from the medico-legal viewpoint, of the actual anatomical condition in which the gas poisoning has left the individual. From the practical, industrial viewpoint, it is desirable to save from neglect and oblivion some prophylactic measures and defensive appliances, which have been found useful in the exigencies of war and are worthy of being utilized in time of peace, for the protection of the workers in certain industries more or less dangerous to health.

Lustig (Italy).

The effects of asphyxiating and lacrymogenic gases as studied during the war, protective measures against their action, and therapeutic procedures were the subject of a contribution by Prof. Allessandro Lustig, Senatore del Regno. The speaker stated that asphyxiating gases appeared on the Italian front, in action, for the first time in 1916. After discussing the nature of poisonous gases and giving a classification of gases used in warfare, he briefly considered the differential diagnosis of gas intoxication, with special reference to the signs of direct irritation, suffocation, general intoxication and cutaneous

irritation. In view of the fact that several war gases are somtimes used, in one engagement, and that different gases are capable of causing identical symptoms, the diagnosis must often remain one of probability.

After defining the characteristic features of asphyxiating gases in general, the speaker contributed a classification of war gases in particular, enumerating the chemical substances, as follows: Chlorine gas; carbon monoxide; "collongite," or phosgene; "palite," a preparation of carbonyl chloride or phosgene; "superpalite," or diphosgene; hydrocyanic acid; "manguinite," or cyanogen chlorine, and cyanogen bromide; methyl chlorosulphanate; dimethyl sulphate; phenyl carbilamin bichloride; "martonite," or bromated ketones; "acquinite," or chloropicrin; arsine, and irritating nitrous vapors. Phosgene was one of the first gases used by the enemy, with disastrous effects, in the form of a mixture of phosgene, superpalite, and diphenylchlorarsine. War gases with a predominantly lacrymogenic or vesicant action were represented by the halogen products of toluene and xylene; dichlormethylic ether; so-called "rationite," or sulphuric chlorhydrine; and especially by mustard gas. or yperite, chemically, dichlorethyl sulphide. The general mortality through the effects of yperite amounted to about 10 per cent, death being usually due to aggravated lesions of the respiratory apparatus or to secondary complications. About 30 per cent of the gassed soldiers were able to return to duty after 8 to 20 days. The Italian contribution includes a brief review of the defensive measures against this dangerous gas, as compiled by the speaker and published by the technical office of the supreme command.

WATER PURIFICATION IN THE FIELD.

The full importance of an adequate and pure water supply, or, rather, the provision of means for supplying the same to the army in the field, had not been foreseen, so that this problem is still a matter of controversy. Although the method of chlorination which was employed by the allied armies in the World War proved efficient and satisfactory, the Congrès de Médecine et de Pharmacie Militaires encouraged further investigations along the line of other than chemical products, and especially of physical methods of sterilization, more particularly those

based on the use of ultra-violet rays or of ozone, for the purification of army water supplies. The employment of chlorine (a solution of chlorinated potash and chlorinated lime) as a purifying agent was found on very extended use to possess important advantages. It still remains to determine more accurately the amount of chlorine required for water purification, and a number of promising devices have been suggested, some of which have been given a trial with good results, so that at the present state of knowledge the employment of chlorine still ranks first for the purification of drinking water on a large scale. Special methods are needed for the clarification of a turbid water supply before the water is subjected to purification by chlorine.

Dendalle (Belgium).

A useful contribution by M. Dendalle, Pharmacien de reserve, Directeur du Laboratoire du Service des Eaux (campagne 1914–1918), describes the purification of the water supply of the Belgian Army in the field, the different methods used and their results, with special reference to the action of chlorine on the water. At the outbreak of the war no great difficulties were encountered in the provision of drinking water, as the troops passed only through well-organized centers. During the concentration of the troops in the Antwerp zone this question was first taken up by the sanitary service, and antityphoid vaccinations were instituted to a limited extent. Cases of typhoid fever having made their appearance early in 1915, prophylactic measures were at once taken, primarily by forbidding the ingestion of unboiled water. The water for distribution was brought from Dunkerque, by portable cisterns, and several sterilizing systems were employed, in the form of boilers, as well as different methods of filtration. But these local measures were not generally adopted. At the beginning of 1917, when the authorities came to realize the difficulties and the danger of the utilized systems, a committe was appointed which decided the creation of a special service, based on the results obtained in the allied armies.

This was the origin of the technical direction of the water service, which consisted of a commander specially experienced in water distribution, a technical officer and a pharmaco-chemist, with consulting members such as a physician-hygienist, a geologist, and a doctor of law. The speaker proceeded to give an account of the manner

by which the extremely important hygienic problem of the water supply was successfully solved under very difficult practical conditions. Upon the basis of actual experience in the field, he pointed out that unless new facts should be advanced, the procedures based on water sterilization by means of chlorine in different forms are entitled to rank first in order of importance, on account of the simplicity of application, efficiency, and inexpensiveness. Sterilization by means of chlorine must be not only a war-time expedient, but its employment should be considered for water distribution on a minor scale in communities which can not afford a water supply brought from a great distance and where the water supply near by does not meet the conditions of safety required for such plants.

Erculisse (Belgium).

In discussing the same subject, Dr. Paul Erculisse arrived at the conclusion that chemical water purification is to be considered as at best only a makeshift, to be applied only after a careful study of the methods aiming at its accomplishment. In spite of the results obtained in the allied armies, this subject should be taken up systematically in peace time, bringing into consideration the needs of the army in the field. In the first place, the army in the field must be accompanied by chemists supplied with the necessary material for the performance of the work they are expected to do, and familiar with the methods to be employed as well as the object aimed at. Detailed instructions must be provided, in order to guard against research along a line more or less inadequate to the desired purpose. The method which seems the best, and toward which future investigations and efforts might perhaps be most profitably extended, seems to be the sterilization of water by ultra-violet rays, preceded by a rapid partial purification, and followed by oxydation and forcible aeration of the water through the atmospheric air. Without at this time entering into details of particular projects, the speaker pointed out that the creation of special easily transportable automobile cars would permit the establishment, close to a spring of more or less potable water, of actual purification works, functioning with a large output. These cars should be accompanied by a series of cistern wagons, permitting the transportation of the water thus obtained into the cantonments of the army division for which

they operate. Besides these cars, movable laboratories on wheels should be maintained, where the different investigations concerning the purification of the water may be carried out. These laboratories would not necessarily have to be restricted to this service, but would be under the direction of a military pharmacist charged at the same time with the execution of all chemical investigations of urgent importance for the requirements of the army.

Zrunek (Czechoslovakia).

Dr. C. Zrunek, Commandant Médecin de l'Armée Tchécho-Slovaque, pointed out that according to experience acquired in the Austro-Hungarian Army the mechanical and chemical methods of purification of drinking water are of no value for this water supply in the field. The physical methods, on the contrary, have been tried and tested with good results, especially the method by boiling, carried out either in special apparatus or by simply boiling the water in ordinary receptacles. Prior to the World War, the mechanical filtration of suspected water was considered as one of the most important methods for improving the water. The Austro-Hungarian sanitary service recommended numerous types of filters, either improvised (by means of sand) or prepared in advance. In the course of the war, however, these methods were rejected by the military hygienists for a variety of reasons. The methods of mechanical sterilization do not lend themselves to the preparation in the field of water free from pathogenic microorganisms. Chemical measures were highly recommended by the German medical press, but have never been employed on a large scale by the Austro-Hungarian Army, the principal cause for this being the scarcity in chemical products. For example, the rapid method of water sterilization by means of iodine could not be adopted for this reason. In the speaker's opinion, chemical measures are not to be recommended, on account of their not being sufficiently reliable, especially in the hands of careless or indifferent soldiers. The simplest chemical means of water sterilization consists of calcium chloride, 33 centigrams of which are dissolved in a hectoliter; the water does not become sterile until six hours later. This delayed action may be reduced to 10 minutes by increasing the quantity of chlorine, but in this case it is necessary to neutralize the excess of chlorine contained in the water, for example,

by means of oxygenated water. Two *physical* methods were employed in the field, namely, purification by boiling and purification by ultra-violet rays. Before being exposed to the action of these rays, the water must be filtered in order to free it from suspended particles. It is difficult to estimate the effective influence of these hygienic measures on morbidity; during 1914 and 1915, the morbidity due to typhoid fever and cholera was very great; later on it diminished, but it can not be stated to what degree this reduction was caused by the control of the water supply or other hygienic measures.

Water purification in the British Army.

The purification of water as conducted in the British Army on Field Service showed the intrinsic value of the adopted measures in the excellent health of the British troops in the World War and their relative freedom from water-borne disease. When the British Army took the field in 1914, the organization of the water scheme was based on the established principle that the Royal Engineers provide the necessary water, calculated on a definite allowance, while the medical department is responsible for its quality, advising as to the processes required for its treatment and ascertaining that the results are satisfactory. The only actual apparatus for the treatment of water with which troops took the field in 1914 was the water cart in one or another of its forms, and by this means chiefly was the water supply of the original small army purified. A battalion now has two carts, each of 110 gallons, which enable the personnel of the battalion to refill the water bottles on the march. The individual British soldier owns his water bottle, holding two pints, for personal supply. In the earlier years of this century the carts were constructed to clarify water by pumping it through cylinders packed with compressed sponges, and then to purify it further by passage through earthenware filter candles arranged in batteries.

In time it was realized that the sponges were not effective for very turbid waters and in addition clogged easily. A new type of clarifying cylinder was then adopted, in the form of a metal cage wrapped around with several layers of flannelette, the water first passing through a perforated terminal box in which sulphate of alumina was taken up, and then depositing suspended matter on the cloth through which it passed, and on

which an aluminum hydroxide layer assisted effective filtration. This type of clarifying reel was fairly satisfactory, but was later improved by increasing the surface area and substituting a close canvas cloth for the flannelette. Road trials showed that the old dome-shaped tanks were less suitable, from the point of view of balance, than cylindrical tanks set transversely, and the latter were therefore adopted as standard. Meanwhile field tests threw doubt on the suitability of filter candles for active service, in view of their friability and the need for regular sterilization and inspection.

As a result, sterilization of water by chemicals was decided on, and chlorine, in the form of bleaching powder, was adopted as being the most suitable, by reason of the fact that it is cheap, easily handled, and capable of exact operation. Experimental work showed one part per million free chlorine, acting for half an hour, to be adequate for most clarified waters. New pattern water carts adapted to this purpose were therefore constructed, comprising simply two large clarifying reels for preliminary clarification with alum, and the large 110-gallon tank (divided into four compartments to give stability on the road) for chlorination. Bleaching powder, with at least 30 per cent available chlorine, was taken as the means of supplying chlorine, and was added in such quantity that a trace of free chlorine, indicated by testing with an emulsion of starch and potassium iodide, remained half an hour after mixing. The value of these new pattern carts, employing chlorination by bleach, was to be tested in the maneuvers of 1914, but the war intervened and the majority of units of the old army took the field with earlier pattern carts.

The aim of all water purification for drinking purposes being to produce a clear, tasteless water, free from harmful bacteria, the problem mainly resolves into the removal of suspended matter and the destruction of microorganisms likely to cause disease. As regards the former, the number and variety of existing water sources in northern France and Flanders made it unnecessary in many instances to carry out filtration through the clarifying reels, and water could often be pumped directly into the tank for treatment. In eastern countries, however, clarification by filtration through the reels was usually essential, and if effectively carried out produced up to 98 per cent

reduction of total organisms. As regards microorganisms a geological study of the water supplies and sources of the western theater of war indicated the almost universal possibility of contamination of the wells which form the chief sources of rural supplies, and vindicated the decision of the British authorities to regard *all* waters as possibly (if not probably) contaminated. In eastern theaters this axiom held good even more justifiably. To deal with such waters effectively sterilization by bleach was the method decided on at the outbreak of the war. Such treatment in any case is a safeguard in the event of breakdown of the clarifying apparatus.

When the British troops took the field, medical officers were instructed that turbid waters should be clarified by the use of alum, 3 grams to the gallon, and then sterilized by the addition of 23 grams of bleach to every 100 gallons (i. e., approximately 1 part per million). Defective clarification in some instances indicated the need for admixing alkali with the alum to insure proper flocculation of fine matter in acid waters, and as a result the substitution of ordinary alum by a clarifying powder of alum, 3 parts, and sodium carbonate, 1 part. Eight grams of this mixture were employed in the clarifying cylinders for each filling of the cart. The empirical use of 1 part per million chlorine, which involved occasional overdosing, led to the elaboration of tests to determine how much chlorine actually is required for any particular water, and finally a standard test case was devised to meet requirements, as a result of considerable experimental work at the Royal Army Medical College, under the direction of Sir William Horrocks. With the general issue and taking this test case into use, the sterilization of regimental water supplies became an exact operation and gave little or no further trouble during the war.

However, the necessity for the arrangement of larger schemes of water supply became evident with the growth of the British armies in France, after the first year of the war, and the enormously increased concentration of men in already occupied areas. As a result, general headquarters took up the matter, appointed a special committee to report on immediate requirements, and to deal with water questions throughout the force. Almost simultaneously, certain of the eastern theaters of war found the same questions confronting them and calling

for similar solution by the provision of large schemes. The scheme adopted for the western theater envisaged the provision of numerous "water points" (groups of large storage tanks elevated at the side of road loops), from which regimental water carts could be rapidly filled with purified water, the water points themselves being brought as far forward as possible, and in many cases eventually being connected up by pipe lines to the front-line trenches, or to canvas store tanks close behind. These forward water points would serve also to supply troops advancing to occupy new country, pipe lines being run forward after the advancing troops as rapidly as possible. The water points were to be replenished by pumping from deep wells of good quality—in some cases a considerable distance away—or by the use of sterilization plants. The majority of troops on service can be catered to with a regimental system of sterilization in water carts by bleaching powder and larger schemes in the rear areas employing chlorine gas as a substitute for chloride of lime. All the larger sterilization apparatus employed chlorine gas, administered by the Wallace-Tiernan gauge. Noteworthy and interesting features are represented by the formation of water tank companies, sterilization plants on motor lorries or on barges, and stationary land plants, the institution of a standardized motor lorry sterilization plant for water tank companies.

With special reference to the organization of water supplies in a force on service, the regimental water arrangements in the British Army are based on the two water carts per battalion, the selection and treatment of water controlled by the regimental medical officer and his staff of trained "on water duty" men, using bleaching powder and the official test case, and on the individual soldier's water bottle, sterilization in which can be effected by tablets of acid sodium sulphate. Divisional schemes of water supply, the boxing of tube wells, etc., are carried out by the commander of Royal Engineers controlling his three field companies, and assisted by the divisional pioneer battalion. Sanitary control of such schemes is in the hands of the assistant director of medical services of the division and his staff, at whose command are the trained personnel of the divisional sanitary section. Behind the divisions, the larger schemes were controlled from General Headquarters by a special staff,

with representatives in each army corps, and the standing water committee including representatives of the Department of Engineers, medical services, general staff, and transport. In these schemes were employed corps troops companies of the Royal Engineers for the necessary works, and the skilled chemist who formed the personnel of the water companies, together with sanitary officers of the Royal army medical corps, for the necessary hygienic control. Valuable work was carried out by the mobile field laboratories, both hygienic and bacteriological, in connection with the examination of new and established water schemes.

Sacquépée (France).

The importance of a supply of potable water for the troops was emphasized by Doctor Sacquépée, Médecin Principal de 1re classe, Professeur au Val-de-Grâce, as one of the greatest problems in military hygiene. Experience in the course of the war with various water-purification methods led to the extensive utilization of hypochlorite, the employment of which was based on its own merits no less than on the failure of other procedures, so that so-called "javellization" became the customary method of water purification in the French Army. Stationary purification centers were established, some utilizing "continuous javellization" while others were based on "automatic javellization." In the former a proportionately calculated quantity of Javel's extract is allowed to flow into a given volume of water, by means of very elementary apparatus. This procedure possesses the advantage of great simplicity, after the installation has once been put in running order, but, on the other hand, requires a steady oversight. In automatic javellization, distribution of the hypochlorite is made by circulating water itself in such a way that the quantity of hypochlorite used is exactly proportionate to the volume of water to be purified. Numerous apparatus have been constructed on this principle, some of which have been extensively and successfully utilized, being applicable under all conditions with slight modifications. Such automatic systems have the evident advantage of being relatively simple and not cumbersome, while reducing the necessary control to a minimum. Turbid waters must always first be clarified (by means of sponge clarifiers, Buron filters, or small sand filters), no matter what method of water purification be employed. For future use sterilizing apparatus

through ozone and ultra-violet rays enter especially into consideration, these procedures having the additional great advantage of providing a practically unlimited output. The utilization of a given procedure is naturally governed in part by local conditions, as well as by the intrinsic value of the apparatus. The speaker in concluding suggested the advantages of centralizing and industrializing the sterilization of water, a plan which would not only prove of decided economic advantage but also provide a greater security with a greatly facilitated supervision.

Rolland (France).

According to M. A. Rolland, Pharmacien de l'Armée, Géologue à l'Institut Scientifique du Maroc, in the chemical control and purification of water in the field, the utilization of chlorine best meets the requirements of a sufficiently mobile system which guarantees the healthfulness of the water supply while preserving its palatable properties. However, the employment of hypochlorites, as in so-called "javellization," is open to criticism on account of the instability of these substances, and the speaker expressed himself in favor of the general employment of liquid chlorine, as in use in America under the name of "chlorination."

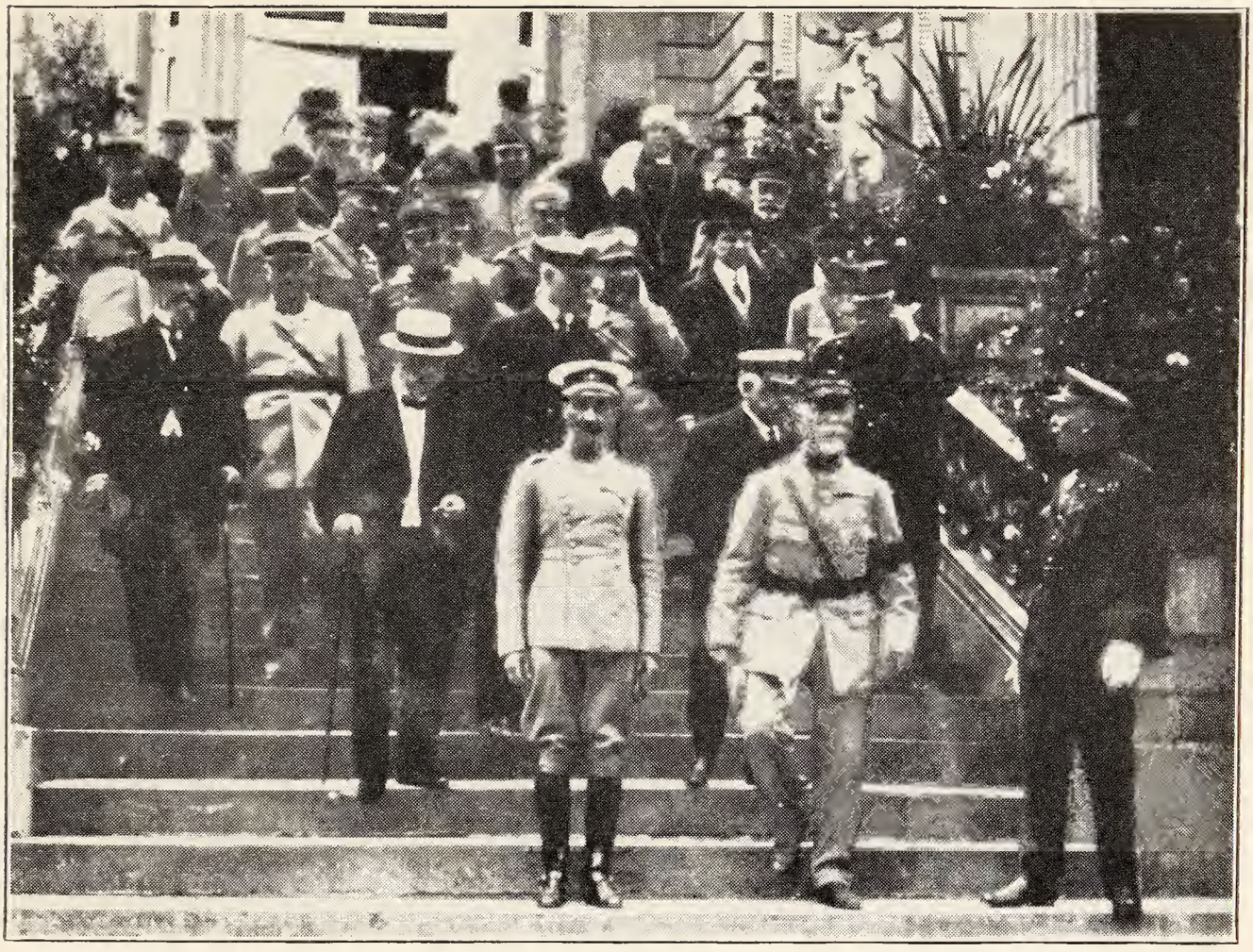
Cambronero (Spain).

A procedure of individual water purification by means of colloid ferric hydrate was offered for consideration by Saturnino Cambronero, Pharmacien en Chef de l'Hôpital Militaire de Madrid. No claim of originality was made, as this forgotten method was already utilized in 1872. It consists in the precipitation of microscopical particles suspended in drinking water by adding an irreversible synthetic colloid, thereby causing coagulation. This colloid is the hydrosol of ferric hydrate. The procedure may be utilized for purifying the water for a group of four to six soldiers, or for a single individual. It is not offered as a method of sterilization, because no absolute hygienic value can be attached to sterilizing methods based on the mechanical elimination of bacteria, but it possesses sufficient relative hygienic value to enter into consideration as one of the measures for water purification in the field.

Vasconcellos Cruz (Brazil).

The value of ferric alum for purposes of water purification was discussed by Dr. Alberto de Vasconcellos Cruz, and the conclusion was arrived at by the speaker that coagulation by means of alum should be the method

of election whenever a volume of turbid water is to be purified. The procedure is well understood, and its adoption, when properly employed, involves no disadvantages of any kind. For field service, water wagons should be furnished containing reservoirs for decantation, filters, and receptacles for the filtered water. In addition, these water wagons should contain the necessary accessories for raising the water from the place where it is obtained, so that it may be thoroughly mixed with the alum. The necessary apparatus must also be provided to insure the passage of the water through the decanters and filters. A laboratory where all chemical and bacteriological investigations can be carried out should be established in a neighboring town, as selected by the technical officers; one laboratory assistant will thus suffice for the local control of the water purification. When the water supply is turbid and presumably contaminated by injurious germs, clarification and sterilization are indicated. When the water supply is turbid but free from contamination by possibly harmful germs, clarification by itself alone is sufficient. When the water supply is clear and does not contain an excessive amount of organic matter but is suspected of contamination with dangerous germs, the employment of alum is dispensable, and sterilization of this water will suffice. After the water has been mixed with the alum solution, it should be decanted and filtered. Absolute security demands the demonstration of nonalkalinity of the filtered water and its freedom from objectionable germs. The establishment of the minimum quantity of alum required is a purely economic question, while the establishment of the maximum quantity which the water will bear involves a hygienic problem.

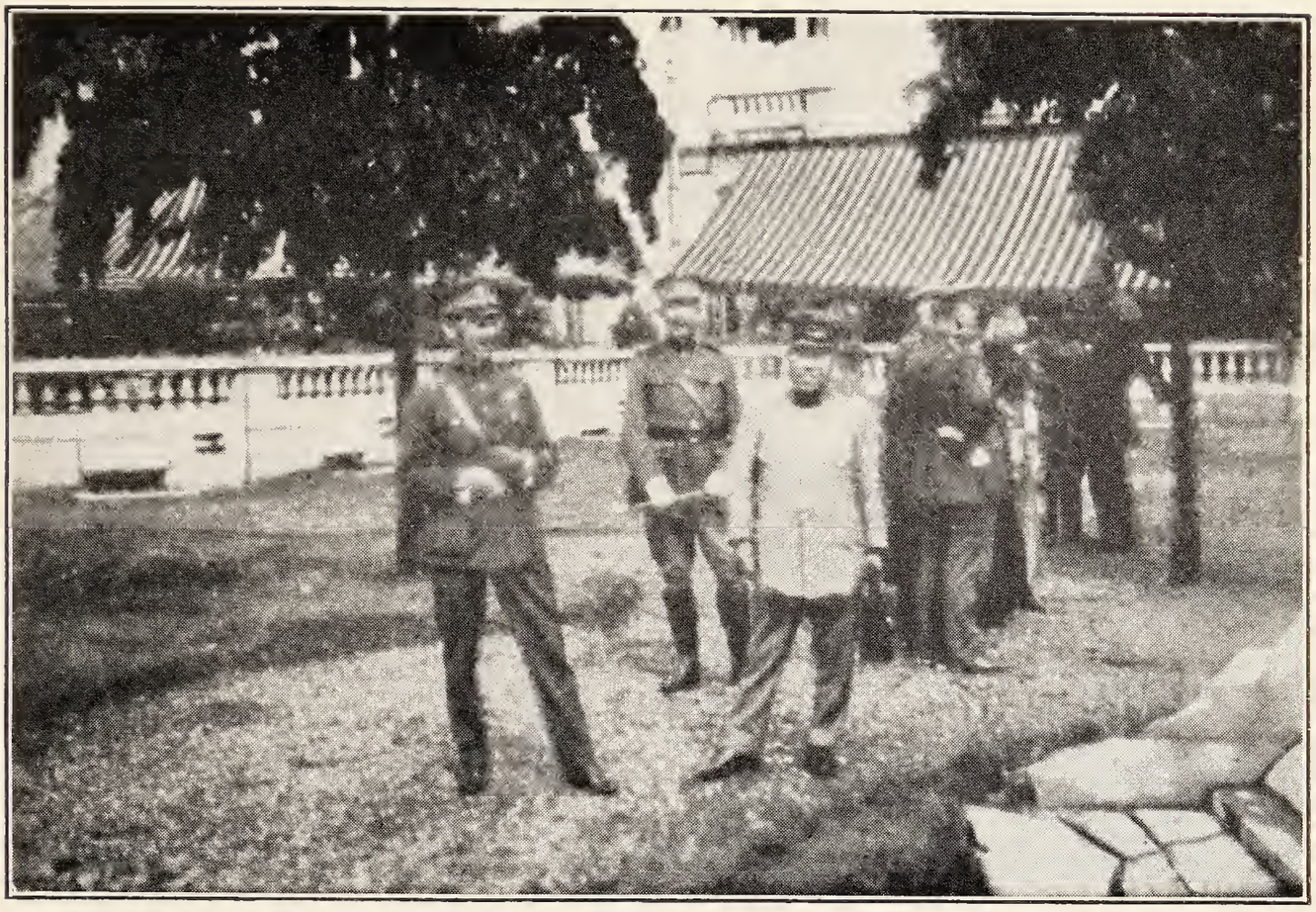


SPA. AFTER THE DELEGATES WERE RECEIVED BY THE MAYOR OF THE CITY AND THE SENATOR OF THE DISTRICT, BOTH OF WHOM APPEAR IN THE FOREGROUND IN CIVILIAN CLOTHES.

SPA. AFTER AN INSPECTION OF THE HYDRO.

SPA. THE HEADQUARTERS OF THE KAISER AND THE EMPEROR OF AUSTRIA DURING A LARGE PART OF THE WAR.

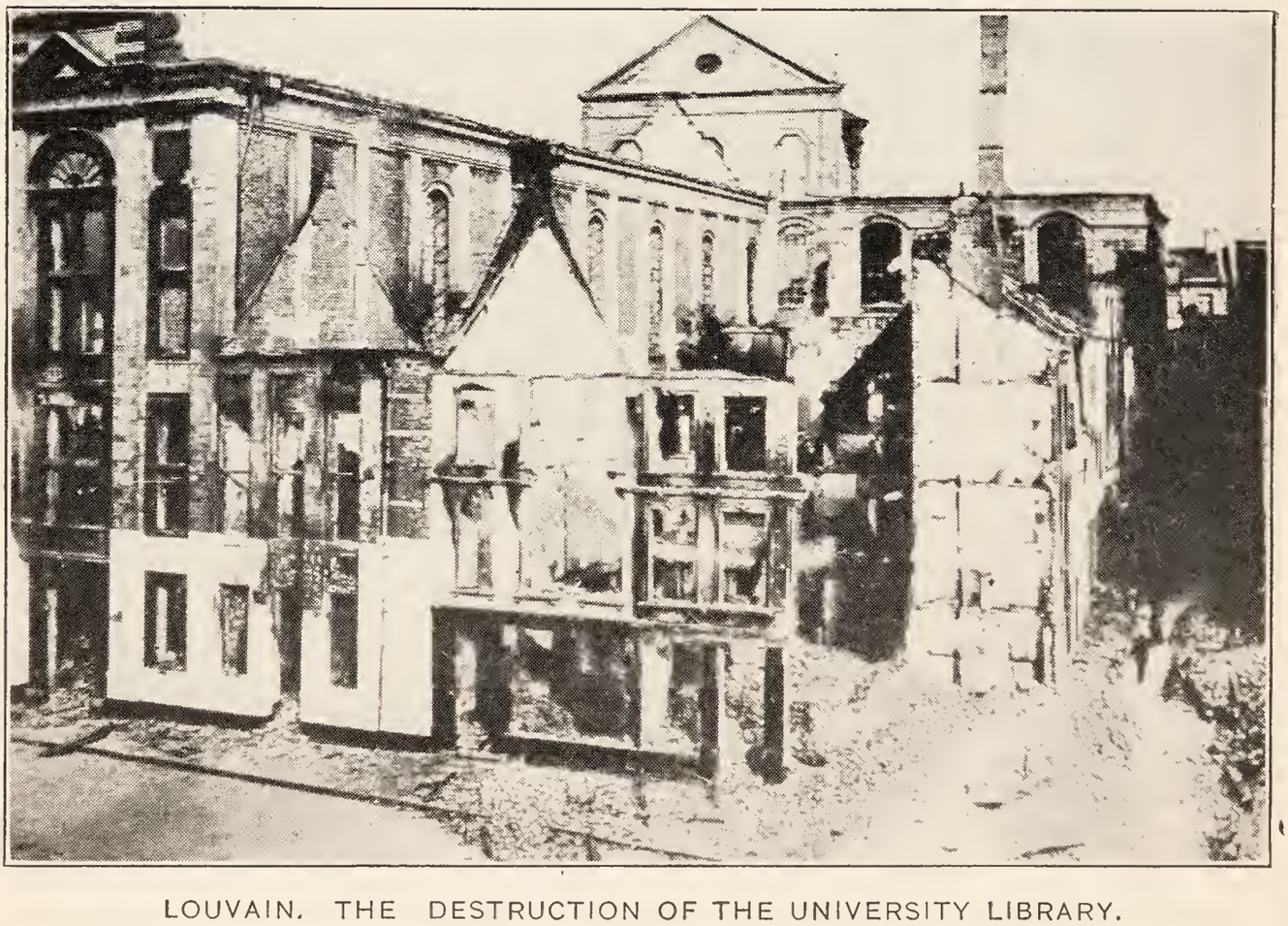
SPA. REPRESENTATIVES OF VARIOUS NATIONS.



SPA. REPRESENTATIVES OF VARIOUS NATIONS.

WOLUWÉ. MEMBERS OF THE CONGRESS INSPECTING THE HOSPITAL FOR WAR CRIPPLES.

LOUVAIN. SOME OF THE EFFECTS OF WAR.



LOUVAIN. THE DESTRUCTION OF THE UNIVERSITY LIBRARY.

SUPPLEMENTARY NOTES.

The valuable papers and addresses delivered by the delegates have been concisely reviewed in this report. In regard to the general organization of the army medical service and the relation of the military services to the Red Cross, the suggestion was approved by the congress that in times of peace the medical profession of each nation should aim at a state of preparedness, in case of a declaration of war on the part of another nation. During warfare, medical consultants of tried and tested standing in their particular sphere of usefulness are in future to be equally responsible to the supreme command with representatives of the medical service.

It was decided by the congress that in peace or war, measures concerning the adaptation of medical knowledge to military organizations should always be subjected, before acceptance, to consultation and close cooperation between the military authorities and the army medical service. Sanitary organization can never be successful without due deferences to military considerations, and on the basis of this argument, the representatives of the army medical corps must be members of the staffs with the same rank as officers of the fighting forces, so as to give them a vote in the settling of medical matters. An unconditional requirement consists in the investing of representatives of the army medical corps in every large military unit, working under the military authorities and in collaboration with other services, with the power to prepare and enact measures pertaining to the functioning of the army medical corps in all its capacities. These responsible representatives of the army medical command are to be assisted in times of war by properly qualified technical medical consultants, picked from the ranks of physicians, surgeons, hygienists, and chemists. In order to insure a sufficient force of competent workers in the various lines of professional service, the medical graduates and practitioners of the nation, irrespective of specialties and restricted activities, should be challenged to compete for some particular service, their eligibility for appointments to be graded according to their fitness. All advances along industrial and hygienic lines are to be utilized for the benefit of the army medical corps in a number of ways, notably in the transportation, evacuation, and treatment of the wounded.

The first great step toward the internationalization of surgery, medicine, pharmacy, and sanitation was taken in the work of this congress in its endeavor to secure the urgently needed uniformity of treatment of the wounded and disabled. No matter through how many hands the patient passes, his treatment should remain fundamentally the same on the basis of the new principles urged by the congress.

Industrial and hygienic improvements will also be utilized for the establishment of the sanitary formations and the technical units attached to them. The declaration of war should find an adequate material equipment as regards quantity no less than quality. The special competence of army pharmacists is to be taken into consideration in the organizations required for the investigations of chemical problems of military importance. This congress may be described as one of the epoch-making events in the advance of military medicine and internationalization of medical interests.

Aside from the well-filled programs of the several sessions of the congress, as well as many sectional and individual conferences, a series of instructive, official visits had been carefully arranged for the delegates. These tours of inspection included the military hospitals of Brussels and Woluwe and the reeducational center for war cripples in the latter city. Other visits were paid to the model military hospital of Antwerp and to the central pharmacy of the army, which has an equipment for making all drugs and medical-pharmaceutical supplies used by the army. It is noteworthy that in Belgium and some of the other European countries there is a special department of pharmacy in the army.

The delegates were received at the City Hall of Antwerp by Burgomaster Max and given a reception. An instructive trip was made to the famous thermal station at Spa, and other visits concerned the Borgoumont Sanatorium and the so-called "abri de l'Empereur" (Imperial Shelter). The entire congress participated in the trip to Spa, where the delegates were received by the city and county authorities. Special trains had been placed at the disposal of the delegates by the Belgian Government.

July 21 was the national fete day in celebration of Belgian independence. In the afternoon the delegates were escorted to attend the Te Deum service at the cathedral, where front seats had been reserved for them. On the next day, a visit was paid to Seraing, where the American delegate, assisted by the secretary of the congress, performed several operations in the Industrial Hospital. He also operated in the army hospital in Liege. Seraing is a Belgian industrial town, situated on the right bank of the River Meuse, 3 miles southwest of Liege. The old palace of the prince-bishops of Liege, who formerly resided in Seraing, now forms the façade of the Cockerill engineering and machinery works. These works produce a large output in the form of steam machinery, locomotives, and engines of various kinds. They occupy some 270 acres and employ about 14,000 persons, a considerable proportion of the entire population of Seraing, which in 1919, when the last census was taken, was 37,274. Valuable coal mines and the most important glass factory in Europe are situ-

ated in the vicinity. The Cockerill Co. maintains its own hospital, school, and orphan asylum, for the benefit of its employees.

The Incorporated Federation of the Mutualistic Societies of the Seraing Basin has instituted a modern surgical service and clinic in the Seraing Industrial Hospital. This enterprise is the first of its kind to be realized in Belgium, and illustrates the purpose of the people to take a step in advance in the domain of mutual service and altruism. This experimental departure in social medicine, which is being tried out fully for the first time in Belgium, is being watched with great interest by many other European countries. Owing to the large number of contributors, the members find themselves entitled, for a minimum outlay, to the very best of care and treatment in case of illness or disablement. Before the war the monthly contribution of heads of households, married men or fathers, was fixed at 2 francs per month, single persons, young unmarried men under 20 years of age, paying only 1 franc per month. The creation of the Medical Dispensary and Clinical Institute was accomplished on the basis of mutualistic cooperation and coordinated centralization. The growth of this interesting enterprise is illustrated by the progressive increase in membership from 14,000 members in 1914–1918 to 42,000 active members in 1922. The aim and object of these federated services of the Seraing Mutualistic Societies is to pay all general expenses, extraordinary disbursements, and cost of propaganda. There are special services which allot indemnities for disablement, pay for treatment in a sanatorium, or give a fixed indemnity to all members past the age of 60 years. A medico-surgical service provides medical and surgical care, the consultation of specialists, and a supply of remedies.

The importance of *internationalization* of medical and surgical military knowledge was emphasized at the congress by the delegate from the United States of America, who referred in this connection to a proposal offered by the Spanish delegate, concerning the establishment of an international museum and the compilation of statistical data for international use. The greatest benefits would undoubtedly accrue from the consummation of this plan of internationalization of medical and surgical military science. The advantages to be anticipated from the application of war-taught knowledge to the problems of industrial medicine, surgery, and sanitation can not be overemphasized.

A number had suggested the advisability of repeated conferences of this type from time to time, and the American delegate moved that a committee be appointed by the chair from the attending delegates, for the consideration of this question, and be instructed to report the results of their deliberation to the congress. In presenting this resolution, he gave the following as—

"A VISION."

(1) An active society as proposed by the commandant, Doctor Voncken:
(2) The collection and standardization of many practical lessons learned during the war in medicine, surgery, and sanitation;
(3) Active military surgeons, retired medical officers, reserve officers, and those serving with or for troops link together in a broader brotherhood as humantarian scientists;
(4) A meeting every two years, or as material is forthcoming, and conference is possible;
(5) A volume of transactions, a ready reference book;
(6) A general monthly or a supplement to a monthly, such as the "Archives Medicales Belges."

This is a possibility; can it be made a reality?

He stated that medical military officers are not separated in the same way as are members of other branches of the service, and suggested that an international association of military surgeons would bring closer cooperation, better mutual understanding and possibly be another influence tending to prevent war. Of course anything of this nature decided by the congress would be subject to the approval of the respective Governments.

The resolution was passed. Considerable discussion arose over the name "International," as the French and Belgians objected to including the Germans for some time to come, whereas the Swiss delegate recommended that they be invited to the next meeting. The American delegate suggested that the conditions laid down by the King of the Belgians for the present meeting should stand also for the immediate future.

A committee was appointed by the chair to consider the feasibility of this "vision," and its report was one of hearty approval. The congress then appointed a permanent committee, consisting of eight nations, as follows:

President: Doctor Wibin (Belgium).
Members: Doctors Uzac (France), Van Baumberghen (Spain), Bainbridge (United States of America), Sterling (British), Caccia (Italy), da Fonseca (Brazil), and Thomann (Switzerland).
Secretary: Doctor Voncken (Belgium).

The permanent committee held a meeting and made plans in regard to future congresses and methods of procedure. These plans were passed unanimously by the congressional delegates, and were then sent through official channels to all the allied, associated, and neutral powers with a request for criticism, comment, and advice.

The nomination of this permanent international committee was an accomplishment of the congress which offered the most hopeful prospects for the future. In all countries the young men who represent the pick of the nation are entrusted to the military medical service which is called upon to play a far-reaching part in the health

and happiness of the men and their progeny. From the eugenic viewpoint the future of the world is concerned in the successful handling of this world problem. Justice, however, can not be done to it as long as the best planned efforts are scattered and decentralized. The vital strength of military medicine must be centralized with this object in view for military medicine alone when once officially organized in all countries will be in a position to propose measures which can be reliably applied and efficiently controlled. A periodical reunion of a congress of military medicine and pharmacy would permit the realization of this object and would confer upon all humanity the benefit of the progress achieved by one of the attending nations. Such a reunion may be expected efficiently to maintain the bonds established by the first congress between military surgeons and pharmacists.

GENERAL CONCLUSIONS.

The following are the official conclusions of the congress, unanimously formulated and accepted by the delegates. It can therefore be stated that they represent the opinions to date on the subjects discussed of all the allied, associated, and neutral powers which took part in the first "Congrès International de Médecine et de Pharmacie Militaires."

GENERAL ORGANIZATION OF THE ARMY MEDICAL SERVICE—RELATION OF THE MILITARY MEDICAL SERVICES TO THE RED CROSS.

1. The congress held that all measures concerning the adaptation of medical science to the military unit, in peace as well as in war, are to be formulated in close collaboration with the army military authorities and the army medical service.

2. In order that in all military measures, when circumstances permit, certain medical considerations, without which all sanitary organizations are deficient, be taken into account it is imperative that the representatives of the medical service be made a part of the "Etats-Major," with the same rank as the army officers, there to deal with the problems of their particular service.

3. It is indispensable that in each large unit under the authority of the army military authorities the representatives of the medical service, in agreement with the same and in connection with the other services, be authorized to carry out orders related to the functioning of the medical service in all its forms, so as to insure the transmission and superintend the execution of these orders.

4. In war time it is necessary that medical technical consultants, chosen among physicians, surgeons, hygienists, and chemists especially qualified by their scientific standing, be added to the repre-

sentatives of the medical service responsible to the supreme command.

5. The entire medical personnel of the nation, whether belonging to the active army or counting as complementary personnel, must participate in the organization of the medical service, contribute to its general progress, and prepare for the special part to be allotted to each according to his ability.

6. The material utilized by the medical service for the transportation, examination, and treatment of the wounded and for the organization of the sanitary formations and technical organs belonging thereto must be planned in accordance with all corresponding industrial and scientific advances and be available in sufficient number at the onset of hostilities.

7. In organizations for the study of the chemical problems which arise in all armies advantage must be taken of the special competence which has been gained by military pharmacists.

TREATMENT OF FRACTURES OF THE LIMBS.

Among the principles for fracture treatment learned by experience in the war, the congress emphasized—

1. The imperative necessity for constant and frequent radiographic control in the course of treatment, and in certain cases, at the bedside.

2. The necessity for modifying the removal of bone splinters (esquillectomy), in compound fractures, to meet the needs of drainage and surgical disinfection.

3. The primary importance of directing treatment from the first day with regard to the functional future of the limb, and of resorting in this behalf to physiotherapeutic measures, and especially to the earliest possible mobilization of the limb.

4. The increasing rarity of indications for the classical treatment of fractures by immobilization of the limbs in plaster apparatus. The obsolete pre-war appliances should now be abandoned in favor of those which have proven efficient in the armies, notably walking apparatus and simple devices for continuous extension, combined with or without suspension of the fractured extremity.

5. The necessity of reducing transportation apparatus in war time to a few simple, strong, elementary models constructed on the principle of permitting continuous extension, with interchangeable parts, and easy of application.

6. The advantageous organization in peace time, in the great industrial and urban centers, of specialized services in analogy with those of warfare, equipped with a competent staff and all the requisite equipment.

ANTITUBERCULOSIS CAMPAIGN IN THE ARMY.

1. The fight against tuberculosis in the army, in order to be efficient, must first of all be based upon the strict enforcement of general and personal hygienic measures, universally admitted as useful, and more particularly concerning the quarters, food supply, physical education, prevention of predisposing affections, antialcoholic crusade, and related items.

2. The antituberculosis education of the people and of the soldiers must be improved by means of pamphlets, health talks, conferences, and similar measures.

3. In view of the peculiar mode of evolution of tuberculosis, it is advisable to provide each man with an individual health card and medical booklet containing his antecedents and his state of health during the period of active service. It is desirable for these documentary data to include the period of military service in the reserve.

4. Routine repeated examinations of all the men are indispensable, especially during the first time of their incorporation in the army.

5. There is reason to refuse admission to the army to all men infected with tuberculosis.

6. The corresponding selection should be carried out in two stages: First, in the course of enlistment of recruits, and, second, directly after the men's incorporation in the army.

7. From the prophylactic viewpoint, temporary or permanent removal is required in the presence of tuberculosis of any kind.

8. It is desirable to carry out further investigations in order to determine the practical value of various numerical indexes and biometric measurements which have been purposed for the estimation of the degree of body vigor, especially in its relation to tuberculosis.

9. The establishment of specialized services for following up suspected cases is recommended.

10. Practical instructions concerning the diagnosis of tuberculosis must be made available for army surgeons.

11. In behalf of national prophylaxis, the congress recommends that the antituberculosis civil administration and the military authorties should be permanently associated. The army is to notify these administrations, without delay, of the discharge of soldiers because of tuberculosis.

ANTIVENEREAL CAMPAIGN IN THE ARMY.

The "Congres International de Medecin et de Pharmacie Militaires," having taken cognizance of the extent and gravity of the venereal peril in armies, believes that military as well as individual

and social interests imperatively require the most energetic antivenereal measures, and advises as follows:

1. Venereal diseases, being infectious, should be fought primarily among the civilian population, in order to reach all foci of infection and guard against contamination of the army.

2. In all armies and navies the antivenereal campaign, in all its forms, should be organized or improved, as required, on the basis of the following principles: (*a*) Educational measures, as extensive and instructive as possible; (*b*) measures aiming at the preservation of health among the men; recreations, soldiers' and sailors' clubs, sports, etc. Control of sources of contagion. Conservative prophylaxis, by placing at the soldier's or sailor's disposal the use of prophylactic stations, individual toilet requisites, and other hygienic contrivances; (*c*) measures concerning infected soldiers and sailors. Early discovery of venereal infections; isolation of contagious cases; treatment by the most efficient methods in specialized services; ultimate control of the patients.

3. At the time of their discharge, syphilitics who are still in need of care are to be instructed concerning civil services where they may apply for treatment.

POISON GAS IN WARFARE.

1. It is of the utmost importance to provide for the treatment of gassed soldiers in the course of warfare, in special, mobile organizations, established in the immediate vicinity of the front (in analogy with the so-called Z hospitals of the French Army).

2. The treatment of acute cases must be entrusted to specialists in gas intoxication.

3. A very obvious, distinctive sign must figure on the health card of every soldier suffering from war-gas poisoning. This sign to be attached only after the diagnosis has been confirmed in a special hospital for such cases.

4. The *positive* onset of pulmonary tuberculosis, as a distinct sequel of gas intoxication, is altogether exceptional.

5. The permanent disabilities to be taken into consideration by experts in determining the invalidity percentage of old gas intoxications practically consist of (*a*) tachycardia, irritable heart; (*b*) chronic respiratory disturbances (emphysema, asthma, pulmonary adhesions); (*c*) more or less extensive loss of teeth; (*d*) neurasthenia and neurosis; (*e*) ocular disturbances (rare and easily recognized).

6. In the establishment of the percentage of invalidity, it is necessary to take into account the cardiac fatigue which may eventually follow upon chronic respiratory disturbances (obliterative fibrous bronchiolitis, emphysema), as well as the diminished resistance of the lung against ultimate acute pulmonary infections.

7. The lesions enumerated under headings 5 and 6 enter into serious consideration only after grave, acute gas poisoning, which has necessitated prolonged treatment in the hospital.

WATER PURIFICATION IN THE FIELD.

1. In the World War the purification of water in the Allied Armies was generally obtained by the method of chlorination.

2. The most frequently utilized substances were Javel's extract, calcium chloride, and liquid chloride.

3. This very extensive employment of chlorine as a purifying agent has shown it to possess certain important advantages.

4. The determination of the chlorine dosage, although approximately settled for practical purposes, nevertheless still remains indefinite.

5. Multiple apparatus were utilized, the majority of which may be made serviceable in the future, according to the indications furnished by special circumstances.

6. In the presence of turbidity, special apparatus must be provided in order to clarify the water before it is treated.

7. At the actual state of our knowledge there is reason to continue the utilization of chlorine for the purification of water in the field.

8. The utilization of other than chemical products should be kept in mind, however, occasion presenting.

9. It is desirable that investigations be followed along this line, with special reference to physical methods of sterilization, notably those based on the employment of ultra-violet rays, or of ozone.

RESOLUTIONS APPROVED.

At the final session of the congress certain resolutions were unanimously approved.

(1) The International Congress of Military Medicine and Pharmacy has obtained results which justify great hope for the future.

At a certain period of life, toward the age of 20, in every country, young men, including the best of the race, come under the care of the military medical service. It is easy to imagine how important a part the latter can play in the health of the race; it is not too much to say that from the point of view of eugenics it has a world-wide rôle.

(2) This world-wide rôle can not be played to the full on account of dispersion of effort. There exists in military medicine a live force which must be centralized, and it is only by official organization of military medicine in every country that measures can be instituted which would be certain of application and thoroughly supervised.

(3) The periodic reunion of a congress of military medicine and pharmacy would permit of the realization of this object, and the

whole human race would profit from the advances made by one or other of the nations.

It would maintain effectively the association established by this congress between military doctors and pharmacists.

It is to be understood that the same rules which were in force at the Brussels Congress will apply to future congresses.

(4) It is also desirable that an international association of military medicine and pharmacy should be formed under the same conditions.

(5) With this object in view a permanent committee has been elected by the Brussels Congress. It is designed to centralize all the results obtained, and is charged with the arrangements for the next congress.

ALPHABETICAL LIST OF CONTRIBUTORS.

Antonin, I.—Médecin-Général de Division; Inspecteur du Service Sanitaire de l'Armée Roumaine.

Baduel, C.—Colonel-Médecin; Directeur Général Italian Red Cross

Bainbridge, W. S.—Commander, Medical Corps, United States Naval Reserve Force.

Balanesco.—Médecin, Lieutenant Colonel (Roumania).

Baumberghen, A. Van.—Médecin-Major, Spanish Army.

De Block, Fr.—Commandant (Belgium); Professor of Hygiene, Military School for Officers, Brussels, Belgium.

Businco.—Tenente Medico di Complemento aiuto alla Catedra di Anatomie Patologica nella R. Università di Cagliari (Italy).

Caccia, F.—Tenente Colonello Medico; Libero Docente di Traumatologia nella Regia Università di Roma (Italy).

Cambronero.—Pharmacien en Chef de l'Hôpital Militaire de Madrid (Spain).

Carruccio, M.—Professeur; Lieutenant Colonel Médecin de Complément (Italy).

Chambers, J.—Surgeon, Rear Admiral, C. M. G., British Navy.

Chuan, S. A.—Surgeon General; President Army Medical College, Pek'ng (China).

Colard, A.—Médecin de Bataillon de 1re Classe de Réserve; Attaché à l'Hôpital Militaire Anglo-Belge, Brussels (Belgium).

Connerade, E.—Pharmacien de 1re Classe de Réserve, Professeur à la Faculté Technique du Hainaut (Belgium).

Costa, A.—Commandant-Médecin; Professeur à l'Académie de Santé Militaire (Spain).

Dackweiler.—Water Purification Expert.

Damazio, A.—Médecin-Major de l'Armée Brésilienne; Professor à l'Ecole d'Application Médico-Militaire (Brazil).

Declairfayt.—Docteur (Belgium).

Decoster.—Docteur (Belgium).

Delrez, L.—Professeur à la Faculté de Médecine de Liège (Belgium).

Dendalle, M.—Pharmacien de Réserve; Directeur du Laboratoire du Service des Eaux (Belgium).
Denhaene.—Médecin Principal de 1re Classe (Belgium).
Depage, A.—Professeur Docteur (Belgium).
Derache, P.—Chef du Service de Chirurgie à l'Hôpital Militaire de Bruxelles (Belgium).
D'Espine, A.—Ancien Recteur et Professeur Honoraire de L'Universite de Geneve (Switzerland).
Dujardin, B.—Médecin de Bataillon de 2e class. Chargé du Service des Affections Vénériennes a l'Hôpital Militaire Belge du Havre (Belgium).
Dzierzkowski.—Capitaine, Docteur (Poland).
Erculisse, P.—Water Purification Expert (Belgium).
Espinasse, A.—Professeur (Switzerland).
Ferraro, D.—Lieutenant Colonel Medecin de la Marine Royale Italienne.
Fisher, A. G. T.—(England).
Franz, K.—General; Professeur agrégé à L'Université Charles à Prague; Général Médecin, Czechoslovakian Army.
Frédéricq, H.—Professeur à la Faculté de Médecine de Gand; Médecin de Bon de 1re Classe de Réserve; Ancien Chef du Service des Intoxications par Gaz à l'Ambulance de l'Océan, Section de Vinckem (Belgium).
Glibert.—Médecin Principal de 2e Classe; Chef des Services d'Urologie et de Syphiligraphie a l'Hôpital Militaire de Bruxelles (Belgium).
Goormaghtigh, N.—Docteur, Military Hospital, Hoogstade (Belgium).
Granjux.—Médecin Major de 1re Classe en Retraite (France).
Guillaumont.—Docteur (France).
Hansen, C. T.—Chef d'Etat-Major du Service Sanitaire de l'Armée Danoise (Denmark).
Hendrix, M.—Médecin de Bon de 1re Classe; Chef du Service de Prothèse du Service Sanitaire de l'Armée Belge (Belgium).
Hybbinette, R.—Médecin de Bataillon (Sweden).
Lakaye, R.—Médecin de Bataillon de 1re Classe de Réserve (Belgium).
Levit, J.—Commandant-Médecin; Professeur agrégé à l'Université Charles à Prague (Czechoslovakia).
Lustig, A.—Prof. Col. Med. Senatore del Regno (Italy).
Marneffe, de.—Médecin Principal (Belgium).
Meagher, E. T.—Surgeon Commander, British Navy (Britain).
Mendes, G.—Professor; Tenente Colonello-Medico (Italy).
Neumann, F.—Docteur (Belgium).
Nienhaus.—Colonel; Médecin de Division de la 6e Division (Switzerland).
Nyssens, E.—Docteur (Belgium).
Oyama, K.—Surgeon Lieutenant Colonel, Imperial Japanese Army, Medical Corps.
Petit, M.—Médecin de Bon de 1re Classe; Chef du Service de la Restauration Fonctionelle par le Travail (Belgium).

Picqué, R.—Médecin Principal de 2e Classe; Professeur Agrégé d'Anatomie à la Faculté de Médecine de Bordeaux (France).
Pilcher, E. M.—Colonel, C. B., C. B. E., D. S. O., M. B., F. R. C. S., R. A. M. C. (Britain).
Pochon.—Médecin Major de l'Armée Suisse (Switzerland).
Reichborn-Kjennerud.—Médecin Divisionaire (Norway).
Reynders, R.—Médecin de Bataillon de 1re Classe, Hôpital Militaire de Liége (Belgium).
Ritchie, T. F.—Lieutenant Colonel, D. S. O., M. B., R. A. M. C.
Rolland, M. A.—Pharmacien de l'Armée; Géologue à l'Institut Scientifique du Maroc (France).
Rouvillois, H.—Médecin Principal de 1re Classe; Professeur de Chirurgie de Guerre à l'Ecole d'Application du Service de Santé Militaire au Val-de-Grâce (France).
Sacquépée, E.—Médecin Principal de 1re Classe; Professeur à l'Ecole d'Application du Service de Santé Militaire au Val-de-Grâce (France).
Santamaria, A. S. de.—Docteur (France).
Santucci, S.—Generale Medico (Italy).
Sieur.—Inspecteur Général (France).
Souza Ferreira, J. A. de.—Major-Médecin de l'Armée Brésilienne (Brazil).
Spehl, P.—Médecin de Bataillon de 1re Classe de Réserve; Attaché à l'Hôpital Militaire Anglo-Belge, Bruxelles (Belgium).
Sterckmans, C.—Médecin de Bon de 1re Classe (Belgium).
Stirling, A. D.—Major, R. A. M. C. (Britain).
Tant.—Docteur (Belgium).
Ten Hove, A. C.—Docteur, Lieutenant Colonel (Holland).
Tonneau, R.—Docteur (Belgium).
Uzac.—Médecin Principal de la Direction du Service de Santé au Ministère de la Guerre (France).
Van der Smissen.—Médecin Principal de 1re Classe; Directeur Général, Ministère de la Défense Nationale (Belgium).
Vasconcellos Cruz, A. de.—Docteur (Brazil).
Vincent.—Médecin-Major de la Division du Service de Santé au Ministère de la Guerre (France).
Watry.—Docteur (Belgium).
Wibin.—Inspecteur Général du Service de Santé de l'Armée Belge (Belgium).
Willems, C.—Médecin de Régiment de 1re Classe; Professeur Agrégé à l'Université de Gand. Chirurgien en Chef de l'Hôpital "La Beloque" (Belgium).
Wilmaers, L.—Médecin-Général, Service de Santé (Belgium).
Zrunek, C.—Commandant-Médecin, Czechoslovakian Army.

MEETING OF THE COMITÉ PERMANENT AT BRUSSELS, BELGIUM, FEBRUARY, 1922.

The first meeting of the permanent committee, following that held at the time of the International Congress of July, 1921, was held in Brussels, Belgium, in February, 1922, under the presidency of Inspector General Wibin and secretaryship of Commandant

Voncken. The following nations were represented: Italy, Britain, France, Belgium, Switzerland, Spain, and the United States of America. The replies which had been received by the Secretary of the committee, in acknowledgment of the requests for advice and approval, were most cordial, and not only favored similar congresses but urged that there be a prompt meeting of the permanent committee to arrange for the next one, which was thought advisable at an early date. In accordance therewith cabled notices were forwarded to the countries on the committee, and they were all represented except Brazil, who because of the short notice could not reach Brussels in time.

The conference was opened at the Brussels Military Hospital, and the meeting on the next day was continued at the office of the Service du Santé. Although several delegates presented official invitations for the next congress to be held in their countries, earnest deliberation resulted in the acceptance of the urgent invitation extended by the Italian delegate on behalf of the Italian Minister of War. It was therefore decided to hold the next congress in Rome in May, 1923. It is planned to hold meetings of the congress every two or three years and of the permanent committee when necessary. Thus there will be opportunity for every phase and aspect of all military, medical, surgical, sanitary, and pharmaceutical subjects to be covered, and in a reasonable number of years a complete and practical medical history of the World War will be produced, giving a correlation of the experiences gathered from all.

The permanent committee proceeded to a discussion of subjects desired for consideration at the next congress. Lists of such subjects had been submitted by each nation represented, and these documents were tabulated. It was decided by the committee to restrict the number of subjects discussed at any one congress, so as to insure the exhaustive handling of the various topics, with inclusion of all related data in addition to an analysis of the main contribution in all its phases. Adopting this restriction, each future congress will take up four general and two pharmaceutical topics. In this connection it is necessary to keep in mind that in some European countries, notably Belgium, the department of pharmacy, which includes sanitation, is a distinct division of the army. Two main papers on every subject are to be furnished, one a contribution from the country in which the congress is held, the other to come from the nation or nations in collaboration, to whom this subject is officially assigned. The selection of contributory nations by the permanent committee was based on the accomplishment of some special work or extensive experience along that particular line of inquiry. The questions were all written out and discussed, extended and revised, until a definite shape had been agreed upon.

According to the final decision, the *first* question for the next congress concerns (1) the general principles of evacuation of the wounded in the fighting armies; (2) the organization of such evacuations, taking into account the exigencies of therapeutic needs; (3) the adaptation of medical and surgical therapy to the various conditions resulting from the necessity for evacuation of the wounded. This question is to be considered in a paper from Italy, the seat of the Second International Congress, and one from France.

The *second* question takes up the collaboration of military and civilian authorities in their functioning in matters of social hygiene, physical education, and prophylaxis, including demographic statistics of social diseases, such as tuberculosis, venereal infections, alcoholism, mental stigmata, early discovery of incipient disease, notably tuberculosis; organized and centralized prophylactic measures, such as vaccination and immunization. Italy is to contribute the first paper, while Britain and America will collaborate in the preparation of the second article on this important subject.

The *third* question before the next congress is a critical study of methods of disinfection and disinfestation in times of peace and war. Italy will provide the first paper, Switzerland and Spain joining their activities for the second contribution.

Data concerning the *fourth* question, the treatment of wounds of the chest involving the lung and the sequelae of thoraco-pulmonary wounds, are to come from Italy and Serbia.

The question assigned to the pharmacy department calls for the discussion of chemical army laboratories, and will be taken up by Italy and by Czechoslovakia.

The suggestion was offered, leaving the decision to the discretion of each country, to arrange a meeting of military surgeons in the years in which no International Congress is held, for the collection of material for eventual use at the congress of the succeeding year. The permanent committee, furthermore, deliberated the question of the various specialties, and decided that dental and oral surgery are specialties under the heading of surgery.

The official organ for the publication of the transactions of future congresses was selected, in the form of the Archives Médicales Belges, a well-known periodical published monthly under the auspices of the Belgian Army, with a staff whose names are all more or less familiar in connection with activities during the war. The Archives Médicales Belges is printed by war cripples in the Belgian Military Institute for Vocational Reeducation. After temporary interruption of 30 months, due to the war, publication of the periodical was resumed in November, 1916, at a time when military medicine was at the zenith of its activity.

The date for the next meeting of the permanent committee was set for the early part of May, 1923, just before the gathering of the Second International Congress of Military Medicine and Pharmacy in Rome. (The term "medicine" covers surgery and all its specialties.)

The American delegate had the honor of being received by the Queen of the Belgians on February 28, 1922. He and others were escorted through Belgium's great medical universities in Liege, Brussels (the birthplace of Vesalius), Louvain, and Ghent. After a tour of inspection through all military schools and main military hospitals, some of the delegates were conducted through the famous Louvain Prison, which provided some interesting experiences. Here a number of improved methods have recently been introduced in the line of mental tests and examinations of the prisoners on admission, with the result that about 40 per cent of the convicts were found to be of inferior mentality or actually insane. These tests are carefully prepared by neuropsychiatrists and anthropologists of criminal subjects and aim at discovering some mental weakness, which, although not reaching the degree of insanity, renders it doubtful whether the persons can be held responsible for certain acts. The Belgian prison administration sends men found to be of unsound mind to a special prison for such cases. Another 10 per cent are known to become insane in the course of their incarceration in the Louvain Prison, where disciplinary measures are extremely severe and include the enforcement of solitary confinement. The inmates of this prison, to which the most desperate criminals are sent, are kept under the so-called cell system, meaning that they are locked up in their cells during 23 of the 24 hours; also during the single hour permitted for exercise each man remains by himself. The Louvain prisoners do not see each others' faces, which were formerly kept veiled. This shrouding has recently been abolished, but the men must turn their backs, facing toward the wall, when anyone approaches. The seats in the prison chapel are so arranged that each prisoner can see only the altar and the priest on looking up above the high walls of the separate boxlike compartments.

On being asked for the expression of an opinion concerning the Louvain Prison and its management, the delegates were ready to appreciate and commend the excellent sanitary conditions, the general cleanliness and security of the prison, from which escapes are unknown, but they questioned the solitary confinement system, making mention of the fact that the object of imprisonment is the protection of society far more than the infliction of a penalty on the lawbreaker. In a comparative discussion of the relative merits of prison systems employed in the United States and Great Britain,

attention was called to the fact that the protection of society must cover both the present and the future; at the time of his release, the chastened prisoner should be returned to society a better man and a more useful member of the community. Otherwise, society will be contaminated and endangered by the unconverted and embittered reprobate. Men who are kept caged in solitary confinement for years often lose their minds, as admittedly happens in 10 per cent of the cases, while others become so profoundly depressed and disheartened that at the expiraiton of their terms they become helpless burdens on the community.

The majority, however, are thrust back into society to act as more dangerous elements than before their incarceration, moved by a spirit of revenge and despair, predestined ringleaders, as it were, in the surreptitious work against the Government and the established social system. From the viewpoint of a broader humanity, it was argued that some consideration should be shown these unfortunates, and suggested that the prisoners be permitted to work together, as far as their behavior warrants the privilege, that they should eat together, enjoy games in the open air, and be given the benefit of lectures and entertainments, in groups. Two large prisons in Brussels, which were included in the tour of inspection, are conducted in a general way on the same plan as the Louvain Prison—including careful mental tests on admission—but the prisoners are here allowed in some cases to work together. The Louvain officials were evidently grateful for all suggestions, and expressed their intention of permitting the convicts to work in a common room. The plan of serving meals to the prisoners together was to be taken into consideration. It is probable that a commission will be sent before long to this country, in order to inspect the American prisons and to study its methods of penalization. The treatment of the offender and the administration of penal institutions present many complex problems, more or less difficult of solution, and of fundamental importance to the welfare of the community.

The First "Congrés International de Médecine et de Pharmacie Militaires" may be described as one of the epoch-making moments in the advance of military medicine and internationalization of medical interests. May it not be considered in the days to come one of the factors in bringing about a permanent peace?